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THE SIGNIFICANCE OF ANÆMIA AS AN OPERATIVE RISK[1]

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THE value of statistical evidence is very indefinite unless the statistics are large, and the conclusions can only be applied to the concrete case after an analysis that takes into consideration an abundance of minute detail that is seldom obtainable. Hence I have considered it more profitable to study individual cases of anæmia out of my case records, hoping that the conclusions arrived at might be of value in illustrating the treatment of similar cases. I have not drawn any conclusions from one or two cases, but will not have time to cite more than one or two illustrative cases of any one kind. I find that the records of my early cases are well adapted to the purpose because the operations were performed without the benefit of our recent advances in methods of diagnosis or operative detail and abounded in instructive complications. It has often been said that we learn more by our failures than by our successes.

For such a study it is convenient to divide anæmia into two types, anæmia with compensation and anæmia without compensation.

Anæmia with compensation is that type in which the patient's functions have so far compensated for the anæmia that he or she may be treated up to a certain point as a normal individual. One of the characteristics of this type is that when the cause has been removed tonics and nourishing food do not promptly relieve it. An anæmic habit has been acquired and it takes time for a general readjustment of function that will be compatible with a different quality of blood. I will relate a typical case of this kind operated upon January 13, 1892, twenty-one years ago, before I was in the habit of making a blood count.

The patient, Mrs. Van A., had been having profuse menstruation for years and had become so anæmic that I hardly expected her to recover from the operation. The mucous membranes were strikingly pale, and the skin had a pronounced cachectic, yellowish hue such as we see in patients with advanced carcinoma. Nevertheless she stood the operation of abdominal hysterectomy for a large fibroid tumor as well as the average case, recovered promptly and went home at the usual time. I saw her twice during the following three years and could not discover that her lips had any more color nor that her skin was less sallow, although she had had no more hæmorrhages, and said that she felt well and was attending to her household duties without the assistance of a servant.

As a contrast to this one we might cite cases of frequently repeated moderate hæmorrhages due to internal hemorrhoids or gastric ulcer in which the patients lose strength and resistance rapidly and die unless the hæmorrhages are soon stopped.

In Mrs. Van A.'s case I explain the difference by the fact that there had been time between the menstrual losses for almost complete recuperation. She lost a little ground each

[1] Read before the American Gynecological Society, Washington, D. C., May 8, 1913.

month, yet not so much but that she could continue a life of moderate activity and develop compensation about as fast as the anæmia progressed. She retained a fairly normal amount of fatty tissue and maintained considerable muscular development. As the muscles are great storehouses of energy the presence of a certain amount of muscular development is perhaps the most important factor in the production and maintenance of compensation. In the cases of frequent, moderate hæmorrhages the patient does not sufficiently make up for the loss between the attacks to prevent serious deterioration, not only of the blood but of the tissues and functions of the body.

The anæmic habit of such cases is well illustrated by a case of moderate anæmia, Miss A. K., aged nineteen years, upon whom I performed myomectomy December 15, 1901. She came to me October 29th with a blood count of 4,100,000 erythrocytes, 14,200 leucocytes and 65 per cent of hæmoglobin. I sent her to a rest cure for six weeks, from which she returned with the same number of erythrocytes, the same hæmoglobin percentage and a count of 12,200 leucocytes. She stood the operation as well as any one could and recovered from it rapidly. We might say that she was compensated for 65 per cent hæmoglobin and 80 per cent erythrocytes.

Mrs. M. L. E. had a blood count May 25, 1910, of 4,380,000 erythrocytes, 7,200 leucocytes and a hæmoglobin percentage of 43. I resected the ovaries for a complete cystic degeneration of one and almost complete of the other. She went home after a prompt, uncomplicated convalescence and returned in nine months with a count of 4,100,000 erythrocytes, 6,000 leucocytes and hæmoglobin percentage of 45. She seemed to be compensated for 45 per cent hæmoglobin and 80 per cent erythrocytes. I have records of several cases that remained below 50 per cent from one to several years and yet were able to do light housework with but little or no complaint.

A study of cases of this type of anæmia has revealed the following characteristics, all of which were present in most cases and most of which were present in all of them:

The development of the anæmia is gradual, or if it had been produced suddenly or rapidly it has lasted a considerable time. Compensation requires time to come as well as time to go.

Cases of anæmia discovered at the menopause, and supposed to be connected with it, sometimes respond exceedingly slowly to treatment. This is because conditions have for a long time been working to produce and perpetuate the anæmia, and may be of a social, sexual, pathological, psychic or purely physical kind. At the time of the menopause, if not before, the anæmic habit has been acquired and compensation for a certain degree of anæmia has been established. They therefore recover slowly, no matter how favorable the circumstances. The menopause is not to blame except that it does not help the case.

The anæmia of old age partakes somewhat of this kind. It cannot be cured, but the individual, if free from organic disease, lives on and remains apparently normal and comfortable within her limitations and may live longer than she would if her blood had been kept up to the standard of middle life.

Another characteristic is the comfort and vigor with which the duties of a moderately active life are performed by individuals of this type. They do not complain without good cause except when their hæmoglobin and erythrocyte percentages become reduced below their compensation figures, and are not subject to those attacks of irritability, languor and exhaustion that are apt to supervene without apparent cause after slight mental or physical disturbances in patients with a hæmoglobin percentage of 70 or below and an erythrocyte count below 4,000,000.

The compensated case is seldom greatly emaciated unless she inherits leanness or has been sickly in her youth. An abundance of fat appears to be of benefit to the anæmic patient as an operative risk, although I believe it may work the other way with patients whose blood is normal. I have a fleshy patient who is doing her own housework and says she feels well, yet her hæmoglobin is 52 per cent and her erythrocyte count is 4,072,000.

The blood pressure is usually about normal, sometimes slightly above normal. The better the muscular development of the patient, the better is the pressure apt to be at a given hæmoglobin percentage. The pulse is of ordinary frequency and may be quite slow when the patient sits or lies down, but is apt to be unduly accelerated during vigorous

muscular action. The erythrocyte count is seldom much below 4,000,000, sometimes as high as 5,000,000.

Another characteristic has already been mentioned, viz., the slowness with which the anæmia responds to treatment. The functions do not seem to call for better blood. When a person has a compensation for 70 per cent and the percentage is forced rapidly up to 80 per cent he feels overstimulated, for he is producing energy faster than he can utilize or store it. He feels mentally, physically and sexually vigorous, the same as a well-nourished person who feels particularly well. But the hæmoglobin percentage soon goes down to the neighborhood of 70 again or he begins to have toxic or gouty symptoms the same as an overfed person who is not anæmic.

I removed the extremely adherent appendages in the case of Mrs. G. W. M., age 36, in 1905. She was sallow and anæmic and greatly debilitated, but I have no record of a blood count at that time. August 10, 1910, she consulted me about a serous discharge from the nipple which was cured by X-ray treatment. She was otherwise in what she called good health. Her hæmoglobin was 80 per cent, erythrocyte count 4,510,000 and leucocyte, 6,200. I have a record March 15, 1912, of hæmoglobin 60 per cent, erythrocyte 4,660,000, leucocytes 5,000. The first week in May she was treated by her home doctors for an attack of appendicitis. The last of June she went to an excellent sanitarium, and August 20th, after having gained steadily in strength, the percentage of hæmoglobin was 65, the erythrocyte count 5,060,000 and the leucocyte 5,200. As she was feeling well and strong enough I removed the enlarged adherent appendix. She was again in town March 10, 1913, and called upon me and reported that she felt unusually well. I had a blood count made in order to learn at what figures she was feeling so well. The blood from which the erythrocyte count was to be made was lost by the pathologist, but the hæmoglobin percentage was only 67. The blood pressure was 116. I take it for granted that the erythrocyte count was normal or nearly so, as it had always ranged between 4½ and 5 million. She seemed compensated at 67 per cent hæmoglobin. A year and a half after the record of hæmoglobin, which was 80 per cent, she had an attack of appendicitis. Whether or not trying to keep her hæmoglobin up to 80 per cent had anything to do with the cause of the appendicitis I am not prepared to say, but I think it did.

Patients with compensation take anæsthetics about as well as those who are not anæmic and stand the shock of operation and the ordinary loss of blood quite well. They cannot endure excessive drains upon their vitality, but can be brought quite low and recover promptly. The relatively large number of erythrocytes so often present may possibly account for this.

The urinalysis generally shows a slightly subnormal excretion of urea and sometimes a moderate amount of indican or oxalate crystals, but may be entirely normal or be altered by a disordered metabolism, as in the well-nourished subjects.

In the other group of cases, viz., anæmia without compensation, an adjustment of the functions has not taken place sufficient to enable the patient to perform comfortably the ordinary duties of a physically active life with the blood she possesses. Sometimes a relative compensation is found in bed-ridden patients but it is not real, for the comfort depends upon a subnormal demand upon the functions rather than a true compensation.

This group is more important, surgically considered, than the first because it includes the poor risks which are as apt to surprise the operator by bad results as the compensated cases surprise him by good results.

One of the most interesting classes of cases in which compensation may be wanting is that in which a chronic sepsis complicates the anæmia.

I will illustrate by relating the case of Mrs. P. aged 40, seven children, youngest three years old, upon whom I operated April 11, 1889, for chronic pyosalpinx. The right Fallopian tube contained a small quantity of pus and the adhesions were bilateral and extensive, including the appendix vermiformis. The right ovary was in the Douglas cul-de-sac and imbedded in a blood clot the size of a hen's egg, about which the omentum was wrapped. When I separated it from its adhesions the omentum was ecchymotic and nearly as thick as the palm of the hand and required catgut suturing for bleeding areas. The small intestines and sigmoid flexure were also firmly adherent to the mass. The appendix was of course removed. After the operation the pulse was 160 but soon came down to 120 and ranged between 120 and 110 during the first week. The temperature remained below 100° F. Six days after the operation the patient was hungry and eating crackers and beefsteak with relish. About the middle of the second week she began to refuse food, was taken with a moderate septic diarrhœa, failed rapidly and died at the end of the second week. At the autopsy I was surprised to see how perfect the post-operative

repair had been. All of the omental ecchymosis and induration had disappeared and the peritoneal cavity looked healthy excepting some adhesions about the stumps. The only discoverable cause of death was a small abscess in the thigh that had been produced by a hypodermic injection. This was 24 years ago. To-day I would be better able to make an estimate of the patient's resisting powers, and would probably not run into the danger I did in that instance.

As a contrast to this one I could cite many cases of sepsis without anæmia in which the patient would endure ten times as much infection. It is not necessary for me to call attention to the prevalence of hidden foci of infection, except to emphasize their importance in connection with anæmia.

Another class of cases of anæmia without compensation are the bed-ridden, chronic invalids, usually women, with faulty metabolism or other functional disease. If such a patient is not anæmic, or only temporarily so, she may for a time be benefited by her idle life. She may be bed-ridden a large part of the time for years and retain her freshness and youth beyond the usual limits. If, however, she is decidedly anæmic and emaciated she becomes a poor risk. Her blood pressure is low, her muscles are poorly developed and her reserve albumen minimal. This must be remedied by a preparatory treatment that includes either active or passive muscular exercise and judicious feeding. She must be taught physical endurance by giving her something to endure.

Another class includes those who are decidedly anæmic in connection with excessive child-bearing, habitual loss of sleep, mental distress, anxiety, drug habits, unwholesome food and other unhygienic or abnormal influences. They are usually emaciated or considerably underweight and show their physical depression and mental distress in their looks. The pulse is rapid, except perhaps when lying down, the blood pressure low and the temperature often subnormal. They complain of ill feelings and are subject to attacks of nervous irritability or depression without apparent adequate cause. The urine is apt to be concentrated from their failure to drink enough water, and to contain an excess of the phosphates or oxalates, while the daily excretion of urea may be less than the normal average. Such patients are using up energy faster than they create it and require a more or less extended preparatory treatment to render them good risks. The Weir-Mitchell rest cure, followed by regulated exercise and diet, gives good results.

Many cases of so-called neurasthenia, hysteria and chlorosis belong to one of these last two classes of uncompensated anæmia.

Anæmias of short duration, unless very moderate, are apt to give rise to bad risks. The organs are functionating to a scale that requires a certain quality of blood, and there has been neither time for the development of compensation nor for recovery from the anæmia. Convalescents from the grippe, diphtheria, typhoid fever, pneumonia, gastro-intestinal disorders, serious injuries, etc., do not become good risks as soon as the infection or prostration has disappeared,— not until the usual anæmia has been cured, or at least until the patient is able to take active physical exercise with comfort.

Moderate hæmorrhages frequently repeated have already been mentioned. Sudden starvation in such diseases as appendicitis and gastric ulcer and prolonged dieting preparatory to abdominal operations produce uncompensated anæmia with a low resisting power, and the condition should, if possible, be relieved by a preparatory period of judicious feeding before the operation is performed.

In cases of advanced malignant disease, exopthalmos, tuberculosis, parasitic blood diseases, arteriosclerosis, nephritis, sclerosis of the liver and other chronic diseases the anæmia is often uncompensated and thus influences unfavorably the otherwise favorable chances of the patient as an operative risk. It is not safe to estimate the patient's chances alone by the degree of the anæmia, for the risk of the operation will be comparatively good or bad according to the presence or absence of compensation.

With regard to degrees of anæmia I believe that there is a tendency to underestimate the influence of a moderate reduction in the number of erythrocytes. A count of 4,000,000 erythrocytes gives a different hæmoglobin

value from one of 5,000,000 since there are only four-fifths of the number of hæmoglobin carriers, and the hæmoglobin value of the individual corpuscle is usually reduced.

In the treatment of uncompensated cases, my observation has been that large doses of iron or extract of red bone marrow, with small doses of phosphorous, and a liberal allowance of red meat and easily digested fat is often attended with a rapid and considerable improvement in the blood picture. In compensated cases we cannot obtain quick results with such treatment and our aim should be to place the patient as nearly as possible under ideal hygienic conditions, particularly with regard to diet, sleep, exercise and fresh air, and be satisfied with gradual blood changes. Chronic anæmia *without* symptoms and with a certain amount of compensation exists in most patients who are subject to occasional attacks of symptoms, and we find that our remedial measures may restore them quickly to a state of comfort and good health, but the improvement in the blood percentages will only be up to the figures that represent their compensation, after which the hæmoglobin percentage rises very slowly.

As a general rule we might say that patients who have been anæmic long enough to acquire the anæmic habit, who have a normal or rather high blood pressure, an erythrocyte count above 4,000,000, who are leading a physically active life without great discomfort and who are not noticeably emaciated make much better operative risks than the degree of anæmia considered alone would indicate. On the contrary, anæmic patients with a low blood pressure, an erythrocyte count less than 4,000,000, and marked emaciation, who are unable to take a considerable amount of daily active physical exercise with comfort and without complaint, or who are bed-ridden and mentally hyperesthesic or depressed, often make much poorer risks than the degree of anæmia alone would lead us to suspect. Anæmic patients presenting one or more of these characteristics should be studied with reference to the hygienic conditions of their immediate past and the pathological changes present. Starvation, hæmorrhage, loss of rest, erroneous ideas or injurious habits with regard to work or indulgences or social duties, chronic or recent septic infection, incipient or chronic disease of any kind should be looked for. In other words, the surgeon should not operate, except in emergency cases, upon an anæmic patient until he has gone over the case history, the symptoms and the functions of the organs in a searching manner. He should give to each case time enough for this whether it takes an hour, a week, or a month. I am often surprised to see the haste with which some operators get their patients on the operating table and in some cases have not been surprised to see the results.

OPERATIONS ON PATIENTS WITH A HÆMOGLOBIN OF FORTY PER CENT OR LESS[1]

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SEVERAL months ago our worthy secretary, Dr. LeRoy Broun, asked me if I would not look up for this meeting our operative results in cases with a low hæmoglobin. We have examined the cases of the gynecological department of the Johns Hopkins Hospital from 1889 to 1912 and have found records of about 170 cases in which the hæmoglobin was 40 per cent. or below. This, however, by no means represents the total number. In the early days the hæmoglobin estimate was not made as a routine procedure, and from time to time since an occasional omission has occurred. The figures are, however, fairly accurate. I have decided on 40 per cent. as a convenient arbitrary percentage. We are all familiar with the fact that many patients with less than 40 per cent. of hæmoglobin pass through an operation very satisfactorily, but in any case in which the percentage is 40 or less the operator naturally has a certain amount of anxiety. In our group are included a few cases which for various reasons were not operated upon.

Dr. Benjamin O. McCleary has been of the greatest assistance to me in obtaining the necessary data and I gladly acknowledge my indebtedness to him.

For the purpose of convenience I shall divide the cases into two main groups:

1. Patients that recovered.
2. Patients that died.

CAUSES OF THE LOW HÆMOGLOBIN IN THE PATIENTS THAT RECOVERED

Uterine myomata were associated with a low hæmoglobin in 42 cases. As is well known, the position of the myoma is responsible for the bleeding. A myoma may reach very large proportions without occasioning any loss of blood provided it does not in any way encroach on the uterine cavity. On the other hand a submucous myoma not over 1 or 2 cm. in diameter may cause alarming hæmorrhage. Accordingly it is the submucous myomata that are responsible for the very low hæmoglobin.

UTERINE MYOMA

Gyn. No.	Per cent.	Gyn. No.	Per cent.	Gyn. No.	Per cent.
6002	24	9638	21	10618	40
7313	38	9678	23	11077	22
7438	19	9707	26	11139	25
7615	39	9738	30	11743	23
7934	40	9786[3]	20	11889[4]	14
8130	28	10172	29	12086	40
8934	33	10287	35	12234	25
8936[2]	15	10291	35	12257[5]	40
9070[2]	35	10376	30	12890	25
8951	35	10455	40	14247	30
9053	35	10562	35	14458	20
9291	22	10573	38	16001	40
9593	10	10597	25	16405	15
9629	23	10605	30	18185	25

[2] No operation. [3] Tubo-ovarian abscess. [4] Infected. [5] Sloughing.

Hyperplasia of the endometrium was the cause of the low hæmoglobin in 23 cases. This condition is a definite pathological entity that as yet has not been accorded the recognition it deserves. The endometrium presents a most characteristic picture. The mucosa is thicker than usual. The surface may be perfectly smooth or there may be little polypoid outgrowths projecting from the surface. Many of the uterine glands are small and circular on cross section; others are larger and still circular; not a few are at least ten times as large as normal and are somewhat irregular. The glands, whether large or small, have a much higher epithelium than normal and many of them are apparently lined with two or three layers of epithelium. The stroma is much more cellular than usual and its cells frequently contain nuclear figures. The veins in the stroma are often much dilated forming sinuses, which at times are partly or completely filled with organizing thrombi.

Given such a condition one can supply a relatively accurate clinical picture of the patient. She is usually between 35 and 45

[1] Read before the American Gynecological Society, Washington, D. C., May 8, 1913.

years of age and her periods are excessive. As a rule, there is no intermenstrual discharge of any kind. Curettage is usually followed by perfectly normal menstrual periods for from three or four months to a year. The excessive bleeding then recurs, to be again relieved by curetting. The hæmorrhages may be permanently relieved after several curettings, but in not a few cases it is in the end necessary to remove the uterus. I drew attention in 1900 to this group of cases in "Cancer of the Uterus" (p. 479) and in "Adenomyoma of the Uterus" (p. 181, Fig. 53). Since then I have seen this condition several times in young girls. Quite recently I saw a girl, 16 years of age, suffering from a profuse and continuous bleeding. A physician who saw the large amount of mucosa removed felt sure that I was curetting away remnants of an afterbirth and only on microscopic examination of the scrapings was he convinced that no pregnancy had existed. Dr. Elizabeth Hurdon has also seen a case of hyperplasia of the endometrium in a girl still in her teens. This is a condition with which we should all be thoroughly familiar. In some of the 23 cases here mentioned the hyperplasia was of a mild grade, in others it was marked.

HYPERPLASIA OF THE ENDOMETRIUM

Gyn. No.	Per cent.	Gyn. No.	Per cent.	Gyn. No.	Per cent.
5783	31	10136	35	13883	20
5976	17	10165	35	14059	40
6128	33	10409	38	14503	38
6689	25	10562	35	13883, 14698	15
7846	40	10902	14		
8413	25	11049	25	16341, 17244	40
9002, 9340	40, 29	11750, 12070	35, 40	18030	35
10097	20	13344	30		

Squamous-cell carcinoma of the cervix was the cause of the low hæmoglobin in 18 of the cases.

SQUAMOUS-CELL CARCINOMA OF THE CERVIX

Gyn. No.	Per cent.	Gyn. No.	Per cent.	Gyn. No.	Per cent.
7454	35	9266	38	16104	39
7504	22	10849	18	16846, 16889, 17609	30
7786, 7819	30, 35	11198	33		
7840	38	13376	40	18153	12
7900, 9004	30, 33	13545, 13943, 13986	40, 19, 40	18333	35

Pelvic inflammation was apparently the cause of the low hæmoglobin in 13 of the cases. We are all familiar with the frequency with which a pelvic inflammation, especially if one-sided, may simulate a tubal pregnancy and there are probably few of us who have not opened the abdomen confidently expecting to find a tubal pregnancy only to encounter a pus tube or general pelvic adhesions.

PELVIC INFLAMMATION

Gyn. No.	Per cent.	Gyn. No.	Per cent.	Gyn. No.	Per cent.
6615	30	11764	28	16294	38
8146	40	11934	30	16333	20
9139	38	13826	29	16494	40
9569	32	15745	21		
11652	23	16290	35		

Retained placental tissue had brought about a hæmoglobin of 40 per cent. or less in 13 cases. In one of these the loss of blood had been so great that the patient's hæmoglobin was only 15 per cent. on her admission to the hospital.

RETAINED PLACENTAL TISSUE

Gyn. No.	Per cent.	Gyn. No.	Per cent.	Gyn. No.	Per cent
5759	38	9200	37	11893	40
6164	38	9558[1]	35	14801	17
7794	35	9878[1]	30	18073	30
7908	23	10001	15		
8042	30	10148	19		

[1]Endometrium of pregnancy.

Tubal pregnancy. Where the tube is still intact the abdomen may contain no blood, but if the tube rupture or if there be a tubal abortion, the abdomen may be filled with blood, the amount being only limited by the capacity of the patient's abdomen. Consequently the multipara will naturally lose more than the nullipara whose abdominal walls have never been distended by a pregnancy. In 12 of our successful cases the low hæmoglobin was due to a ruptured tubal pregnancy.

TUBAL PREGNANCY WITH A LOW HÆMOGLOBIN

Gyn. No.	Per cent.	Gyn. No.	Per cent.	Gyn. No.	Per cent.
6959	40	11815	28	16296	25
7782	30	11830	35	16615	40
9594	37	13211, 15226	35	17438	23
10170	40				
10829	39	15245	35		

Adenomyoma of the uterus was the cause of the low hæmoglobin in 7 cases. In this group of cases we have a diffuse myomatous thickening of the uterine wall. This may be limited to the anterior or posterior walls, or form a mantle around the uterine cavity. The uterine mucosa passes down into the crevices in the myomatous tissue and in addi-

tion the uterine walls often contain discrete myomatous nodules. The excessive loss of blood at the periods, the severe pain at the period so often noted, coupled with the fact that there is no intermenstrual discharge, and that the endometrium is normal, taken together give a symptom complex which renders the clinical diagnosis relatively certain.

ADENOMYOMA WITH LOW HÆMOGLOBIN

Gyn. No.	Per cent.	Gyn. No.	Per cent.	Gyn. No.	Per cent.
6631	24	13407	40	16603	40
7859	30	14060	35		
11919	40	16010	40		

Chorio-epithelioma. One of our patients (10094) on admission had a hæmoglobin of 20 per cent. Another (18034) came to the hospital with a hæmoglobin of 40 per cent.

Other causes of a low hæmoglobin. In looking through this list it will be noted that in addition to carcinoma of the body of the uterus, hæmorrhoids and prolapsed rectum, where the loss of blood could account for the low hæmoglobin, there were other causes such as peritoneal carcinosis, amenorrhœa, chronic interstitial nephritis, mitral insufficiency, ovarian and pelvic abscess. In these the low hæmoglobin was due to some factor other than the loss of blood.

	Gyn. No.	Per cent.
Abdominal carcinosis	8219	25
Hæmorrhoids	8369	35
Adenocarcinoma of ovary with metastases	8907	40
General peritoneal carcinosis	9312	35
Adenocarcinoma of uterus, left tube and ovary	9570	38
Pregnancy	9940	40
Carcinoma of body of uterus	10838	40
Prolapsed rectum	11325	36
Menorrhagia (no op.)	11347	28
Large ovarian cyst—refused operation	11555	40
Chronic ulcer of cervix	11278, 11562	40
Carcinoma of body of uterus	11762	35
Abscess occupying right side of abdomen after labor	12456	26
Abscess in left broad ligament	13564	37
Ovarian cyst, abscess in right broad ligament	13601	50 (fell to 32%)
Amenorrhœa, infantile pelvic organs, T. B.	14544	30
Tuberculosis of endometrium and appendicitis	15542	21
Hypertrophy of cervix	15838	30
Indefinite menorrhagia	16264	35
Adenocarcinoma of cervix	17080	28
Amenorrhœa, retroposition, pulmonary tuberculosis	14544, 17322	30
Pelvic melanosarcoma and ascites	17377	40

PERCENTAGE OF HÆMOGLOBIN

In our series of patients that lived, 14 had a hæmoglobin below 20 per cent. The lowest were 10 per cent. (9593), 12 per cent. (18153), 14 per cent. (10902), 14 per cent. (11889), 15 per cent. (10001), 15 per cent. (13883 and 14698), 15 per cent. (16405).

In summing up the hæmoglobin in 152 cases we find approximately the following:—

	No. Cases
Between 40 and 36 per cent., inclusive	49
Between 35 and 31 per cent., inclusive	30
Between 30 and 26 per cent., inclusive	29
Between 25 and 20 per cent., inclusive	30
Below 20 per cent	14
	152

OPERATIONS ON PATIENTS WITH A HÆMOGLOBIN BELOW 30 PER CENT.

Curettage. An ether examination with curettage even with a very low hæmoglobin gives rise to little or no trouble, as is indicated by the following list.

CURETTAGE

Gyn. No.	Per cent.	Gyn. No.	Per cent.	Gyn No.	Per cent.
5976	17	13883, 14698	15	For retained membranes	
10097	20	15745	21	7908	23
10902	14	For chorio-epithelioma		7908	23
11049	25	10094	20	10001	15
11652	23			10148	19
13883	20				

Vaginal removal of a submucous myoma. In seven cases this was successfully accomplished. Where, however, only a portion of the myoma is submucous, the greater part of the tumor being interstitial, and the hæmoglobin index very low, the vaginal operation is out of the question and any operative interference is fraught with great danger, particularly when the myoma is sloughing.

Gyn. No.	Per cent.	Gyn. No.	Per cent.	Gyn. No.	Per cent.
6002	24	9678	23	16405	15
9629	23	11743	23		
9638	21	11889(partial)	14		

Abdominal operations in the presence of a low hæmoglobin. These consisted in an exploratory laparotomy, conservative operations, removal of the appendages on one or both sides, removal of tubal pregnancies and the drainage of an abdominal abscess in a desperately ill patient. Even with the low hæmoglobin the patients stood the operations well.

	Gyn. No.	Per cent.
Exploratory laparotomy	8219	25
Conservative abdominal operation	16333	20
Removal of tubes and ovaries	6689	25
Removal of tubes	11764	28
Removal of right appendages	17438	23
Removal of tubal pregnancy	11815	28
Removal of tubal pregnancy	16296	25
Opening abdominal abscess following labor (desperate condition)	12456	26

Hysterectomy on patients with a low hæmoglobin. As seen from the accompanying table, vaginal hysterectomy was performed in two cases and abdominal hysterectomy in 17 cases with success, despite the fact that in one case the hæmoglobin was only 19 per cent. and that in several others it was below 25 per cent. The results clearly show that even with a very low hæmoglobin, hysterectomy may be safely undertaken. In such cases, however, the utmost care must be taken to avoid any unnecessary loss of blood and I have also found that in such cases the shorter the time the patient is on the operating table the better.

HYSTERECTOMIES PERFORMED ON PATIENTS WITH HÆMOGLOBIN BELOW 30 PER CENT.

(a) Vaginal hysterectomy:

Gyn. No.	Per cent.
6631	24
7564 Carcinoma of cervix	22

(b) Abdominal hysterectomy:

Gyn. No.	Per cent.	Gyn. No.	Per cent.	Gyn. No.	Per cent.
7438	19	8413	Curettage. 25	11139	25
8130	28		Hysterect. 38	12234	25
9291	22	9786	20	12890	25
9340	29	10172	29	14458	20
9593.10&23(Op.)		11077	22	15542	21
9707	26			17080	28
				18185	25

PATIENTS WITH A LOW HÆMOGLOBIN, UNABLE TO UNDERGO AN OPERATION AND WHO DIED IN THE HOSPITAL

I shall here briefly record the history of each of these cases. Cases 8804, 11337 and 14477 indicate very clearly that myomata, if left alone, occasionally are the direct cause of death. Elsewhere [1] I have shown that in over 1 per cent. of our myoma cases sarcoma developed in or was associated with the myomata and that in over 1 per cent. of the myoma cases carcinoma of the cervix was found; and further that in 1.7 per cent. of the myoma cases adenocarcinoma of the body was also present with the myomata. Here we have three cases in which the death was directly due to the hæmorrhage from submucous myomata, the hæmoglobin being 20 per cent., 12 per cent. and 10 per cent. respectively.

In cases 10975 and 18533 the low hæmoglobin coupled with the infection was amply sufficient to cause death. In the two remaining cases the carcinoma with its secondary complications naturally caused a fatal outcome.

[1] Myomata of the Uterus, Kelly and Cullen, pp. 169, 262, 274.

A large, sloughing submucous myoma; irrigation and packing of the uterine cavity. Hæmoglobin 20 per cent.; death. Gyn. No. 8804. M. P., white, aged 45. Admitted to the Johns Hopkins Hospital May 30, 1901; died June 1, 1901. For nearly four years the patient had had frequent uterine hæmorrhages and for three weeks prior to admission had passed clots. She had grown progressively weaker and for the last two weeks had had fever. On admission she looked desperately ill; the hæmoglobin was 20 per cent. The abdomen was markedly distended by the myomatous uterus. , The uterine discharge was offensive. The cavity was irrigated and a litre of foul clots came away. Death soon followed.

Submucous myoma, hæmoglobin 12 per cent. No operation; death. Gyn. No. 11337. B. H., aged 38, colored, nullipara. Admitted to the Johns Hopkins Hospital June 6, 1904; died June 10, 1904. Her complaint on admission was weakness and uterine hæmorrhage. She had been married ten years. She began bleeding on December 16, 1903 (7 months before admission); each flow was profuse and lasted two weeks up to March, 1904. She had lost so much in strength that she was forced to remain in bed. After March the hæmorrhages had become constant, very severe at times, large clots had been passed and there had been in addition a very foul leucorrhoeal discharge. The bowels had been constipated and she had suffered a great deal from nausea and vomiting. On admission she was fleshy but very anæmic. The abdomen was tender just above the symphysis on both sides and a mass could be made out extending above the symphysis. The cervix was smooth and normal, the os patulous. Occupying the position of the fundus was a mass the size of a cocoa-nut. The patient bled profusely from the prick in her ear made to obtain the blood for the estimation of the hæmoglobin, although the needle was of small size. Adrenalin had little effect. The bleeding was checked by the use of compresses and collodion. The blood obtained showed a hæmoglobin of 12 per cent, red blood corpuscles 1,828,000, white blood corpuscles 8000. On June 8th the patient was markedly nauseated and vomited. The vagina was packed tight with gauze. The patient continued to grow worse, became irrational and restless, and died on June 10, 1904.

At autopsy, in addition to the myomatous uterus there was double hydrosalpinx and an ovarian cyst, extreme secondary anæmia, fatty degeneration of the heart and other organs, focal necroses in the liver and a healed infarct of the spleen.

Submucous uterine myomata, hæmoglobin 10 to 15 per cent, pulse 160 to 180. No operation. Death from weakness and shock.

Gyn. No. 14477. S. F. B., aged 36, colored. Admitted to the Johns Hopkins Hospital January 6, 1908, died January 7, 1908. This patient was seen at her home on January 6, 1908. She was extremely anæmic. Her hæmoglobin varied from 10 to 15 per cent., her pulse from 160 to 180. She had all the symptoms of internal hæmorrhage, was extremely restless, had marked pallor and was dyspnœic. For some years she had had a very profuse menstrual flow at intervals of from two to three weeks, lasting several days. She would pass a large quantity of clotted blood with a great deal of pain. Her physician at that time advised removal of an abdominal tumor. There had been a partial prolapse of the uterus. She has been confined to bed for some time. When seen at her home she had not voided for 36 hours and her general condition was precarious. The submucous vaginal growth was apparently attached by a pedicle 4 to 5 cm. in diameter. On abdominal examination the bladder was found to be markedly distended and reached almost to the costal margin on the left. This accounted for her inability to void. On the right side could be felt a hard indurated nodular mass, apparently a myomatous uterus movable from side to side, but firmly fixed in the pelvis. On admission to the hospital the condition was so critical that operation was deemed out of the question. The rectal temperature was 94° F. She died at 3 P. M. of the same day. At autopsy a myomatous tumor of the uterus was found. The cervix was dilated to 6 or 8 cm. in diameter. Death was due to extreme weakness and shock.

Puerperal infection developing three weeks after labor. Hæmoglobin 25 per cent. No operation; death. Gyn. No. 10975. B. G., married, aged 20, white. Admitted to the Johns Hopkins Hospital January 6, 1904, died January 8, 1904. This patient entered the hospital with fever, shortness of breath and at the time of her admission she had a hæmoglobin of 25 per cent. She had been married 2 years, had had one child and one miscarriage. Three weeks before she had had a full-term child. For the first day after, she had felt well, but then began to suffer with pain in the abdomen. The bleeding kept up continually. She was curetted 4 days later by her physician, but had a severe chill and fever on the day following. The fever and the chills continued and there was vomiting every day, incontinence of feces, a vaginal discharge and pain in the abdomen. On admission she was exceedingly pale and there was a purulent reddish vaginal discharge. The cervix was soft, the uterus subinvoluted, in anteposition. There was some thickening in the broad ligament and marked tenderness everywhere in the pelvis. Her red blood count was 2,100,000, leucocytes 7200, hæmoglobin 25 per cent. She gradually grew worse and died January 8, at 9:15 P. M.

Thrombosis of the ovarian veins, vegetative endocarditis of tricuspid valve, pericardial effusion, bilateral fibrinous pleurisy, lobar pneumonia. No operation; hæmoglobin 25 per cent; death. Gyn. No. 18533. H. P., colored, aged 40. Admitted to the Johns Hopkins Hospital July 18, 1912, died August 1, 1912. On admission she was irrational and her history had to be obtained from a relative. She had been feeling badly for a month but had worked up to a week of her admission to the hospital. She complained of pain in the lower abdomen and had fever. She had been married 20 years and had had 8 children and one miscarriage. She had always been well up to the present illness, about ten or twelve days before admission. When she entered the hospital she was very drowsy, irritable when aroused, did not answer questions clearly, could not tell her age, but was conscious of the fact that she was in a hospital. She apparently understood questions, but only when they were asked a number of times. The skin was hot and her tongue coated. The breathing was harsh and there were sibilant râles. The heart was slightly enlarged; the pulse rapid. The abdomen was somewhat distended. Its walls were thin. There was considerable voluntary resistance.

On vaginal examination the mucous membranes were found to be pale. There was bulging of the anterior and posterior walls. The os readily admitted the tip of the index finger. The cervix was larger than normal. The fundus could not be made out on account of resistance. The hæmoglobin was 25 per cent.; the leucocytes were 17,400. On the following day the leucocytes were 21,500, red blood corpuscles 3,300,000. On July 20 the patient was gradually becoming worse. Blood cultures showed Staphlococcus aureus.

On July 23d a mass of doughy consistency and tender was found in the right side just in front of the iliac bone.

On July 25th the condition was about the same. The kidneys were acting normally. Red blood cells 1,736,000, whites 20,300, hæmoglobin 25 per cent.

July 30th. The patient refused all food. Nutrient enemata were expelled. The respirations rose to 60 per minute. There was a slight cough with blood-tinged sputum.

July 31st. Consolidation was noted in the lower left lobe. Death occurred at 12.15 P. M.

In this case a Wassermann test was negative. Blood cultures showed staphylococcus aureus. Autopsy revealed thrombosis of the ovarian veins. There was vegetative endocarditis of the tricuspid valves, pericardial effusion, bilateral fibrinous pleurisy, lobar pneumonia, chronic congestion of the liver.

Bilateral ovarian adenocystomata, multiple uterine myomata, carcinoma of the sigmoid, perforation of the

lower bowel, gangrenous peritonitis, hæmoglobin 40 per cent. No operation; death. Gyn. No. 12656. E. C., aged 30, colored. Admitted to the Johns Hopkins Hospital January 25, 1906, died February 8, 1906. This patient had never been pregnant. She was suffering from diarrhœa, having four or five stools a day. She had been passing blood in the stools for a long time, probably a year, but had not suffered from hæmorrhoids. In June, 1905, she had continuous severe abdominal pain, especially in the lower portion; this had gradually become worse. It had borne no relation to menstruation. She had noticed an abdominal swelling about 5 months before admission. The swelling had rapidly increased and night sweats appeared. There had been no leucorrhœal discharge, but loss of weight and strength. She had become very weak and emaciated. On admission the temperature was 102° F., the pulse 120; the red blood corpuscles were 2,720,000, whites 34,400, hæmoglobin 40 per cent.

Her condition gradually grew worse and she died February 8th. At autopsy bilateral ovarian adenocystomata, multiple myomata of the uterus, carcinoma of the sigmoid, perforation of the bowel and a gangrenous peritonitis were found.

Squamous-cell carcinoma of the cervix with extension to the pelvic structures. Metastases to the liver and rectum, double hydro- and pyonephrosis. Hæmoglobin 28 per cent, no operation, death. Gyn. No. 8958. H. B., colored, aged 28. Admitted to the Johns Hopkins Hospital July 31, 1901. The patient gives a history of sudden profuse uterine hæmorrhage in September of the preceding year. She was sewing at the machine at the time, became so weak that she fainted and large clots came away. She has been passing large clots from time to time since then and has undergone some operation at another hospital within the last few months. At the present time she complains of pain in the hip, which radiates up and down the leg, of colicky pains in the abdomen every few minutes and of cramplike pains in the umbilical region. She has a great deal of nausea; even a sip of water will make her vomit. At times she is very hungry, but afraid to eat. She suffers from constipation, increased frequency of micturition and at times difficulty in passing water.

When the patient was admitted she was very weak and considerably emaciated. The inguinal glands were palpable on both sides. There was a foul smelling vaginal discharge, watery in character, and almost the entire vagina was filled with a nodular mass which was fungating; it involved the anterior vaginal wall and extended far out on the lateral walls.

Clinical diagnosis. Squamous-cell carcinoma of the cervix with pelvic involvement. At this time the hæmoglobin was 28 per cent. The patient was in no condition to stand operation. She died on September 3, 1901.

Autopsy. Anatomical diagnosis: Carcinoma of the cervix with metastases in the broad ligament, pelvic, inguinal and abdominal lymph glands, in the labia, the rectum and liver; double hydro-ureter and hydronephrosis. Effusion in the pleural cavities; cystic ovary.

DEATHS FOLLOWING OPERATION ON PATIENTS WITH A LOW HÆMOGLOBIN

We have had 13 patients with a low hæmoglobin that succumbed after operation.

Case		Per cent.	
8024	Abd. hysterectomy for myoma; hæmoglobin	40	Death[1]
10678	Removal of tubal pregnancy; hæmoglobin	15	Death
15314	Removal of tubal pregnancy; hæmoglobin	32	Death
10303	Abd. removal of tubo-ovarian abscess	38	Death
9362	Abd. hysterectomy for squamous-cell carc. of cervix	39	Death
9387	Vag. hyst. for squamous-cell carc. of cervix	35	Death
16132	Explor. abd. op. in advanced squamous-cell carcinoma of cervix	15	Death
18341	Abd. hyst. for squamous-cell carc. of cervix	33	Death
9911	Abd. hyst. for carc. of body of uterus	35	Death
7610	Expl. of abd. Inoperable carc. of ovary	27	Death
10099	Expl. of abd. Inoperable carc. of ovary	35	Death
10306	Abd. removal of pelvic structures for carc. of ovary	38	Death
16098	Abd. hyst. for chorio-epithelioma	35	Death[2]

[1]On 28th day. [2]After several months.

Myoma. In Case 8024 in which an abdominal hystero myomectomy was performed the convalescence, as seen from the history, was normal until the 16th day when intestinal complications developed. We have had numerous abdominal hysterectomies on patients with a hæmoglobin lower than 40 per cent. and had this patient not developed the intestinal complications she would certainly have recovered.

A myomatous uterus, hæmoglobin 40 per cent. Hysteromyomectomy, death. Gyn. No. 8024. Path. No. 4255. S. F., aged 45, colored. Admitted to the Johns Hopkins Hospital July 28, 1900, died August 28, 1900. This patient had been married 22 years, had had one child, no miscarriages. For eight weeks she had gradually been losing weight and strength. When she was first taken ill she had had vomiting and could keep nothing on her stomach. She had noted something growing in the lower abdomen for about two years. There had been slight straining at micturition. On admission the patient was poorly nourished. The lower portion of the abdomen was distended by a rounded tumor mass about the size of a six months' pregnancy. At the time of operation the hæmoglobin was 40 per cent.,

but from the history we could gather no indication as to the cause of this low percentage. On August 1, 1900, a complete hysterectomy was done. Convalescence was normal and the patient was up in a wheel chair on the 16th day. Frequent stools began on the 17th day and continued to the 22d day. In spite of appropriate treatment the patient died on the 28th day. She was delirious for several days and had fever for three days before death.

Tubal pregnancy. Although in Case 10678 the hæmoglobin was only 15 per cent, the patient stood the operation fairly well but died on the following day. In Case 15314 at the time of operation the hæmoglobin was 32 per cent. Most patients with such a percentage would be considered a fair risk. The only two cases of extra-uterine pregnancy that I personally have ever lost each had a complicating general peritonitis associated with intestinal obstruction.

Tubal pregnancy, hæmoglobin 15 per cent. Removal of Fallopian tube; death. Gyn. No. 10678. Path. No. 6910. L. McG., aged 25, white. Admitted to the Johns Hopkins Hospital August 23, 1903, died August 25, 1903. This patient was exceedingly ill when brought to the hospital. She had felt perfectly well until a week before admission. Her last menstruation had occurred five weeks previously. She had been bleeding a little every day for two weeks and one week before admission she had been seized with violent cramp-like pain in the right side. Similar attacks had occurred a couple of times during the week. When she came to the hospital she was exceedingly dizzy and very pale. Her hæmoglobin was 15 per cent. Shortly after admission on the same day the right tube was removed.

After operation the temperature was 101° F., pulse 160. The patient was exceedingly pale, and dizzy. Stimulants were employed, but on the following day the pulse became rapid and weak, the temperature rose and at 6 P. M. was 105.5°. The patient became delirious, extremely restless and died at 8.30 P. M., August 25th. Her hæmoglobin at that time was 10 per cent.

Extra-uterine pregnancy with a hæmoglobin of 32 per cent. at operation; death. Gyn. No. 15314. K. W., aged 35, married. Admitted to the Johns Hopkins Hospital November 26, 1908, died December 1, 1908. She gave a history of having had no children for 13 years. She had missed her period for two months when there commenced to be a slight hæmorrhagic discharge. She was suddenly taken with severe abdominal pain; her skin became cold and clammy and she was in a condition of shock. Her physician immediately brought her to the hospital, but at that time operation was entirely out of the question. After appropriate treatment she rallied somewhat but nausea and vomiting persisted. On November 28th the hæmoglobin was 32 per cent. There was much abdominal pain and distention and operation seemed to afford the only hope. When the abdomen was opened an extra-uterine pregnancy on the right side about the size of a two months' fœtus was found. The abdomen was filled with bright red blood. As far as possible this was evacuated. The patient became gradually worse, grew irrational and died at 4 A. M. December 1st.

Tubo-ovarian abscess. The death in Case 10393 was without doubt due to the dissemination of the streptococcus infection that already existed in the tubo-ovarian abscess. The percentage of hæmoglobin was not excessively low and had it not been for the virulence of the streptococcus this patient should have recovered.

Tubo-ovarian abscess, hæmoglobin 38 per cent., death. Gyn. No. 10393. I. S., aged 26, white. Admitted to the Johns Hopkins Hospital April 6, 1903, died April 11, 1903. This patient had been married three years; had had no children and no miscarriages. For a year she had noticed pain in her right side low down along Poupart's ligament and high up in the groin. The pain was of a dull type and came on at different times, was never constant, never severe. The patient was supposed to have had typhoid in August, 1902. She suffered from severe headache, nausea and vomiting and the abdomen became swollen. There was severe pain, paroxysmal and sharp. The abdomen was prominent in the mid-line and on the right side. The patient was very ill at that time, but finally recovered. During the winter at various intervals she had vomiting spells bringing away tarry blood, but she had had no vomiting of this character for three months before admission. She had lost a great deal in weight and had had slight pain on micturition. On admission the patient was poorly nourished. The abdomen was scaphoid and was tender everywhere. A vaginal examination was not made at that time on account of the extreme tenderness.

Operation April 18, 1903. A right tubo-ovarian abscess was removed. At the time of operation her hæmoglobin was 38 per cent.; the leucocytes were 6500. After operation she developed a streptococcus peritonitis. She had several attacks of dyspnœa, but no cyanosis, and vomited occasionally. She suddenly grew worse, and died on April 11th.

No complete autopsy could be obtained.

Squamous-cell carcinoma of the cervix. Patients with advanced cancer of the cervix are invariably bad risks even though the hæmoglobin index is high. When it is low the immediate outlook after operation is always gloomy.

Squamous-cell carcinoma of the cervix in a patient with a hæmoglobin of 39 per cent. Abdominal hysterectomy; death. Gyn. No. 9362. I. H., married, white, aged 31. Admitted to the Johns Hopkins Hospital January 25, 1902, complaining of a bloody offensive vaginal discharge, and discomfort in abdomen and back. She had had six children, no miscarriages. The bloody discharge had persisted for a year and a half, was slightly offensive, pale pinkish in color. The condition had gradually grown worse during the last nine months, and she had had bearing down pains. There had been a good deal of swelling in the abdomen for the last two years. The cervix was replaced by a deep excoriation 3 to 4 cm. across, and extending far into the uterine cavity. It encroached very closely on the base of the bladder. The body of the uterus was almost normal in size.

On February 6, 1902, an abdominal hysterectomy was performed. Following operation there was marked gastric and intestinal distention and excessive vaginal bleeding. The patient's hæmoglobin on her admission was 39 per cent., but prior to operation it had risen to 56 per cent. Death occurred on February 9, 1902.

The autopsy showed localized fresh peritoneal adhesions, hæmorrhages into various pelvic structures, acute fibrinous pleurisy, acute diphtheritic and hæmorrhagic colitis.

It will be noted that in this case the patient really had a hæmoglobin of more than 40 per cent. It was below 40 when she entered the hospital, but at the time of operation the percentage was 56.

Squamous-cell carcinoma of the cervix with a hæmoglobin of 35 per cent. Vaginal hysterectomy; death. Gyn. No. 9387. M. E. M., married, aged 46, white. Admitted to the Johns Hopkins Hospital February 5, 1902. This patient complained of an offensive white vaginal discharge which was sometimes blood-tinged. She had had ten children and one miscarriage. A year before admission she had had a milky vaginal discharge small in amount, now and then irritating, but not offensive. This had become greenish in color and streaked with blood. In October she had a hæmorrhage and lost a great deal of blood. At that time she had hæmorrhages every two or three days for two weeks. The cervix was curetted and a diagnosis of squamous-cell carcinoma made (Path. Nos. 5574 and 5627). Vaginal hysterectomy was done on February 26, 1902; the patient died about noon on the following day. After operation the pulse, which was exceedingly weak, became stronger and rose to 144. About 4:30 next morning she complained of difficulty in getting her breath and the respirations were gasping in character, 36 per minute. She died on Feb. 27th.

In this case it may be noted also that the hæmoglobin was 35 per cent when the patient was admitted to the hospital on February 5th, but before operation on February 25th it had increased to 54 per cent. so that the operation itself was not done on a patient with a hæmoglobin under 40 per cent.

Squamous-cell carcinoma of the cervix, hæmoglobin 15 per cent., minor palliative operation; death. Gyn. No. 16132. Path. No. 14305. B. J., colored, aged 32. Admitted to the Johns Hopkins Hospital October 20, 1909, died November 11, 1909. This patient had been married 4 years, and had had two children, no miscarriages. There was a moderate white vaginal discharge. For six months she had had severe abdominal pain and the last three months this had become gradually worse and continuous and she had been having irregular uterine bleeding. She had passed many large clots. The bleeding on admission was very profuse. Urination had been frequent and painful, and the patient had lost a great deal in weight and strength.

On vaginal examination the cervix was found firm and rounded. The anterior lip was hypertrophied, the posterior roughened, and indurated, on each side of the cervix was a mass extending up from the cervix. This was firm and immobile. A diagnosis of myomatous uterus, densely adherent and malignant, was made. This patient had a hæmoglobin of 15 per cent.; leucocytes 34,000. It was clearly recognized that a radical operation could not be performed, but on account of the leucocytosis it was deemed wise to do a posterior vaginal drainage. Drainage was also made through the abdominal walls at numerous points. It was realized that little could be done, particularly on account of the low hæmoglobin and the fact that the patient was suffering from mitral stenosis and insufficiency in addition to the local trouble. After operation the patient steadily grew worse and died on November 11th. Carcinomatous masses were found filling the entire pelvis. These were rigid and immobile and there were extensions to the peritoneal viscera and the omentum contained implantations from the growth.

Path. No. 14305. The diagnosis of the tissue from the cervix was squamous-cell carcinoma.

Squamous-cell carcinoma of the cervix with a hæmoglobin of 33 per cent. Abdominal hysterectomy, death. Gyn. No. 18341. I. G., aged 34, white. Admitted to the Johns Hopkins Hospital April 27, 1912, died May 13, 1912. This patient complained of pain in the hip, but chiefly of vaginal bleeding. She had been married fourteen years and had six children, the eldest 13, the youngest 10, and one miscarriage seven years before admission. Three months before, she commenced to have slight vaginal bleeding, but thought that it was a return of the menstrual flow. This bleeding had been getting worse and accompanied by clots. There would be sudden hæmorrhages which made her very weak. She had lost a great deal of blood. The cervix was hollowed out, irregular and friable and almost 8 or 9 cm. in diameter and the growth had extended laterally into the vaginal fornices. The fundus could not be made out. Hæmoglobin 33 per cent.

On April 29, 1912, abdominal hysterectomy was performed. The patient's condition was satisfactory up to May 7th, when she tried to get out of bed.

Her pulse rose to 140 and her temperature to 102.5°. She was still unruly and now asked for morphine continually and complained of pain in her abdomen. The abdomen was soft and there was no induration. Pelvic examination showed that the drainage tract was partly open. A very hard and irregular nodule could be felt which appeared to be carcinomatous. The patient died suddenly at 4 A. M. on May 13, 1912. From the history there was no definite indication as to the cause of death. No autopsy was accorded.

Carcinoma of the body of the uterus. In Case 9911 the hæmoglobin was 35 per cent. and the growth had extended to the vagina, necessitating the removal of not only the entire uterus, but also of the vagina. Such an operation would tax the patient's endurance to the utmost were her hæmoglobin nearly normal.

Adenocarcinoma of the body of the uterus with a hæmoglobin of 35 per cent. and implantations in the vagina. Hysterectomy; death. Gyn. No. 9911. M. B. G., married, aged 53, white. Admitted to the Johns Hopkins Hospital on September 17, 1902, died October 23, 1902. This patient complained of hæmorrhage from the uterus, of leucorrhœa and of great loss of strength. She had been married 38 years, had had nine children, no miscarriages. She had been perfectly well up to the onset of the bleeding in November, 1901. Previous to this she had had no menstrual flow for five months. After this bleeding the periods had been excessive, coming on at irregular intervals up to the time of admission. She also had had an offensive vaginal discharge which was very irritating, and considerable discomfort in the abdomen. She had become steadily weaker, dizzy and short of breath. On admission she was moderately fat but anæmic. Her hæmoglobin was 35 per cent., leucocytes 7800. Situated just to the left of the urethral orifice was a hard indurated mass. This was excised and the wound closed. All around the urethra there was induration. The cervix was somewhat enlarged, the fundus had a very limited mobility. On dilatation of the cervical canal a large amount of very foul pus escaped. The body of the uterus was curetted, a mass of carcinomatous tissue coming away.

On September 22, 1902, an abdominal hysterectomy was performed. The entire vagina was removed with the uterus. The patient died on the following day. No complete autopsy was allowed, but it was seen that the abdominal incision showed no signs of peritonitis. There was no evidence of healing.

It will be noted that in this case after the dilatation of the cervix and removal of the pus from the uterine cavity a long interval elapsed before the hysterectomy was performed, in order that the danger of general infection might be minimized.[1]

[1]The pathological numbers in this case are 6106, 6112, 6129 and 6148.

Adenocarcinoma of the ovary. Where abdominal carcinosis exists the resistance to infection is always lowered. It will be noted that in Cases 7610 and 10099, when the abdomen was opened it was found impossible to remove the growth and the abdomen was closed. In Case 10306 it was necessary to remove all the pelvic organs. In this case death was in all probability due to peritonitis.

Ovarian carcinoma, hæmoglobin 27 per cent.; exploratory laparotomy; death. Gyn. No. 7610. R. L., colored, aged 47. Admitted to the Johns Hopkins Hospital on March 1, 1900, died March 18, 1900. The patient complained of an abdominal tumor. She had been married 26 years, but had had no children and no miscarriages. Her menses had ceased ten months before admission, and up to that time she had been quite well. Since that time she had had persistent nausea and vomiting increasing in severity, and some shortness of breadth. Prior to the appearance of the tumor she was a much stronger looking woman. On her admission to the hospital she was very pale, emaciated; hæmoglobin 27 per cent. The abdomen was occupied by an immense cystic fluctuating mass giving the abdomen a dome-like and extremely tense appearance. The circumference of the abdomen at the umbilicus was 108 cm. The tumor filled the abdomen so fully that it could not be moved at all. On vaginal examination it was noted that the right labium majus was hypertrophied, the outlet nulliparous. The cervix was small and soft and the uterus could not be outlined.

On March 5, 1900, an exploratory operation was done under Schleich's solution. The abdomen was filled with what appeared to be a solid ovarian carcinoma which was adherent to the abdominal wall. No attempt was made to remove the tumor. The patient gradually grew weaker. Nausea and vomiting persisted, the dyspnœa increased. The temperature was 96.4°. The patient died suddenly on March 18th.

Carcinoma of the ovary, hæmoglobin 35 per cent.; exploratory laparotomy; death. Gyn. No. 10099. D. A. M., aged 35, white. Admitted to the Johns Hopkins Hospital on November 21, 1902, died November 28, 1902. She complains of an abdominal tumor. She has been married 13 years, has had three children and no miscarriages. One year ago she noticed that she was growing weaker and at the same time detected a small lump in the lower abdomen. This was not especially hard or painful. The periods ceased and there has been no flow since then. Prior to this time the periods had been longer than usual and more profuse. There had been a great deal of pain and a dull sensation during the last two days of the flow. The tumor has increased more rapidly in size during the last two or three months. Her appetite has been fair, but she has

grown paler and has lost about 20 pounds. There has been a slight leucorrhœa. Micturition and defecation have been normal. On admission she was rather poorly nourished. The lips and conjunctivæ were very pale. The hæmoglobin (November 21st) was 35 per cent. The abdomen was irregularly distended, and there was marked bulging in the umbilical region. No fluctuation could be elicited in the tumor. It was fairly well fixed and slightly tender. The cervix was small and jammed up against the symphysis by a rounded mass which filled the cul-de-sac and pushed the fundus forward. The tumor was not movable. On November 25th her hæmoglobin had reached 40 per cent., red blood corpuscles 4,180,000, white blood corpuscles 7280.

Operation November 25th. When the abdomen was opened, the tumor was found to be made up of a number of small thick and thin-walled cysts of various sizes. These were intimately adherent to the intestine and in the pelvis and it was impossible to say from which ovary the tumor had originated. The left broad ligament was plastered over the tumor and many large vessels entered the growth. It was impossible to remove it. After operation the patient's general condition was fairly good for the first day, but on the second she gradually grew worse, was apathetic and vomited some yellow fluid with a rather fecal odor and at the same time expelled the enema which was ineffectual. The condition gradually grew worse and she died at 6.30 P. M.

No autopsy was obtainable. In this case the low hæmoglobin was not due to any uterine hæmorrhage, but was probably occasioned by the weakened condition of the patient due to the carcinoma of the ovary and also to the excessive nausea and vomiting from which she had been suffering.

Adenocarcinoma of the ovary, polypoid endometrium, hæmoglobin 38 per cent. Panhysterectomy with removal of the ovarian structures; death. Gyn. No. 10306. C. S., married, aged 50, colored. Admitted to the Johns Hopkins Hospital March 3, 1903, died March 11, 1903. She had been married 35 years and had had seven children, three miscarriages. On admission she complained of pain in the back and lower abdomen and of a tumor. The pain had persisted since the birth of the last child 16 years before. She had had severe uterine hæmorrhages. At first they had come on at the regular periods with severe cramp-like pains in the abdomen. After these had lasted three hours she used to have a severe hæmorrhage, the first symptom of the onset of the flow which later lasted from 14 to 21 days. Since January 3d there had been a continuous hæmorrhage with the passage of large clots. She had lost a great deal of weight. On admission the patient was rather cachetic; hæmoglobin 38 per cent., white blood corpuscles 6500. Through the abdominal walls the pattern of the intestines was easily demonstrable. The patient had a tumor about the size of a fœtal head, globular in form. It was very freely movable and could be brought forward to the abdominal wall. It could be shoved up to the ribs on the left side so that it took the position of the kidney. The cervix was enlarged, the body of the uterus was uniformly enlarged, pushed over to the left and adherent. Panhysterectomy with removal of the pelvic structures was performed on March 5, 1903. The patient developed nausea and vomited a dark greenish material. She was markedly constipated, restless, and hiccoughed. She gradually grew worse, and died March 11th. No autopsy was allowed.

Chorio-epithelioma. This patient (Case 16098) was kept in the hospital for a considerable period before an operation could be undertaken. The cervix was first thoroughly curetted and at a later date a complete hysterectomy done. The case was a desperate one. The patient lived for several months. At autopsy it was found that the left iliac vein was involved in the malignant growth and that the lungs contained metastases. In addition there was a peritonitis and parenchymatous changes were found in the kidneys.

Chorio-epithelioma. Hæmoglobin 35 per cent.; hysterectomy; death. Gyn. No. 16098. Path. Nos. 14296, 14528. Mrs. A. S., aged 25, white, a Lithuanian. Admitted to the Johns Hopkins Hospital October 9, 1909, died January 2, 1910. Since the birth of her child ten months ago she has never been well. Her menstrual flow has been profuse. The last period occurred one month ago. Between periods there has been a profuse malodorous discharge, at times serous, at other times bloody. Patient has been in bed ten days suffering from pain in the lower abdomen and back; no fever, but very weak.

On examination she is well nourished but anæmic, pulse 128, regular but poor in quality. The abdominal walls are soft and very relaxed. Extending to within two fingers' breadth of the umbilicus is a hard nodular mass which is freely movable. This tumor extends three fingers' breadth to the right of the median line. Its surface is irregular, firm in consistency and sensitive. There are chains of inguinal glands on both sides. The typical carcinomatous odor can be detected in the room.

On pelvic examination it is found that the patient is bleeding profusely and there is a fetid discharge. The cervix is large, the canal cavernous, and readily admits the index finger. There is marked loss of tissue around the cervical canal, but a curious absence of induration so common in carcinoma. The tissues are soft and friable. The finger in the uterine cavity detects a large spongy mass, filling the uterus. There is marked induration of the broad ligament. The lower part of the uterus is fixed. Before operation the hæmoglobin, on October 9th, was 35 per cent., on November 8th, 36 per cent.; on December 27th, 30 per cent.

Operation, October 11th, curettage; October 18th complete abdominal hysterectomy. After operation the general condition was not good. The pulse was rapid and there was abdominal pain. She grew gradually worse and died on January 2, 1910.

Autopsy. At autopsy it was found that the growth extended out to the pelvic wall on both

TABULATION OF THE PATIENTS ENTERING THE GYNECOLOGICAL DEPARTMENT OF THE JOHNS HOPKINS HOSPITAL WITH A HÆMOGLOBIN OF 40% OR LESS. NEARLY ALL UNDERWENT AN OPERATION OF SOME CHARACTER AND ALL IN THIS GROUP SURVIVED

Gyn. No.	Initials	Color	Age	Date of Admission	Path. No.	Diagnosis	Hæmoglobin on admission	Operation	Hæmoglobin after operation	Date of Discharge
5759	M. J.	W.	32	Dec. 22, 1897	2057	Retained placental tissue	38%	Curettage	46% Jan. 8 53% Jan. 16	Jan. 23, 1878
5783	K. M.	W.	42	Jan. 11, 1898	2079	Polypoid endometrium; slight hyperplasia	31%	Curettage		Transferred to Medical side Jan. 17, 1898
5976	L. Y.	W.	20	Mar. 24, 1898	2270	Slight hyperplasia of endometrium with polypoid formation	17%	Curettage		April 16, 1898
6002	A. G.	W.	34	Apr. 5, 1898	2275	Submucous myoma	24%	Vaginal removal of tumor		April 22, 1898
6128	S. H.	W.	53	May 26, 1898	2389	Polypoid endometrium with slight hyperplasia	33%	Curettage		July 1, 1898
6164	M. T.	W.	32	June 14, 1898	2424	Retained placental tissue	38%	Curettage, repair of perineum, suspension of uterus		Transferred June 28, 1898
6615	E. J.	C.	34	Jan. 3, 1899	2887	Chronic endometritis, pyosalpinx, uterine myomata	30%	Hysteromyomectomy; salpingo-oöphorectomy	27% Feb. 3, 1899 32% Feb. 10, 1899	Feb. 28, 1899
6631	J. H.		54	Jan. 11, 1899	2915	Uncontrollable uterine hæmorrhage, adenomyoma; gland hypertrophy	24%	Vaginal hysterectomy	30% Jan. 24, 1899 44% Feb. 9, 1899	Mar. 5, 1899
6689	F. H.	W.	24	Feb. 7, 1899	2925	Cystic ovaries	25%	Removal of tubes and ovaries. Previous history (No. 5798), curettage; no micro. examination. No. 6043, uterine polypi. Hysterotomy Apr. 27, 1898. Path. No. 2325. Polypoid mucosa with gland dilatation; hyperplasia	32% Feb. 26, 1899 35% Mar. 7, 1899	Mar. 10, 1899
6959	N. S.	W.	27	May 29, 1899	3237	Right tubal pregnancy	40%	Removal of both tubes and ovaries		July 11, 1899
7313	L. H.	W.	45	Oct. 25, 1899	3576	Spindle-cell sarcoma of uterus. Subacute salpingitis	38%	Hysteromyomectomy; salpingo-oöphorectomy. (See page 195 Myomata of Uterus, Kelly and Cullen.)		Nov. 29, 1899
7438	A. W.	W.	43	Dec. 13, 1899	3750	Uterine myoma	19%	Hysterosalpingo-oöphorectomy. (Bisection)	20% Dec. 22, 1899 38% Dec. 28, 1899 48% Jan. 6, 1900	Feb. 10, 1900
7454	M. H.	W.	49	Dec. 18, 1899	3691	Squamous-cell carcinoma of cervix	35%	Vaginal hysterectomy		Feb. 7, 1900
7564	M. W.	C.	50	Feb. 7, 1900	3820 3941	Squamous-cell carcinoma of carvix; with uterine myomata	22%	Vaginal hysterectomy	19% 37% Feb. 23 44% Mar. 6 53% Mar. 25	Apr. 28, 1900
7615	A. R.	W.	51	Mar. 3, 1900	3879	Submucous myoma; cervical polyp	39%	Removal of polyp and myoma		Mar. 17, 1900
7782	S. W.	W.	42	Apr. 30, 1900	4045	Ruptured tubal pregnancy	30%	Removal of tube		May 24, 1900
7786	E. W.	W.	54	May 3, 1900	4040	Squamous-cell carcinoma of cervix	30%	Curettage		May 24, 1900
7794	E. H.	W.	35	May 7, 1900	4046	Retained placenta	35%	Removal of adherent placenta		May 17, 1900
7819	S. B.	W.	40	May 15, 1900	4074	Squamous-cell carcinoma of cervix with uterine myomata; pelvic adhesions	35%	Hysterectomy		June 12, 1900

7840	F. N.	W.	44	May 22, 1900	4083	Squamous-cell carcinoma of cervix; uterine myomata	38%	Vaginal hysterectomy; right salpingo-oöphorectomy		June 16, 1900
7846	L. T.	W.	38	May 24, 1900	4094	Excessive uterine bleeding; slight hyperplasia of the endometrium	40%	Curettage		June 2, 1900
7859	A. B.	W.	52	May 29, 1900	4122	Adenomyoma of uterus; hydrosalpinx	30%	Hysteromyomectomy with removal of appendages	50% June 29, 1900	June 30, 1900
7900	E. A.	C.	37	June 12, 1900		Inoperable carcinoma of cervix	30%	Ether examination only		July 3, 1900
7908	K. N.	W.	33	July 16, 1900	4154	Retained membranes	23%	First operation, curettage; second, repair of cervix and anterior and posterior vaginal walls	34% June 30, 1900 47% July 22, 1900	Aug. 18, 1900
7934	A. E. H.		38	June 26, 1900	4169	Uterine myoma	40%	Hysterosalpingo-oöphorectomy	55% July 20, 1900	July 20, 1900
8042	E. R.	C.	33	Aug. 5, 1900	4269	Retained placenta	30%	Curettage		Aug. 19, 1900
8130	R. M. F.	W.	48	Sept. 11, 1900	4360	Submucous uterine myoma; pelvic adhesions	28%	Panhysterectomy	37% Sept. 26, 1900 48% Oct. 21, 1900	Oct. 21, 1900
8146	B. W.	C.	22	Sept. 20, 1900	4350	Chronic endometritis	40%	Curettage		Sept. 30, 1900
8219	E. F. W.			Oct. 11, 1900	4399	Adenocarcinoma of omentum, (origin?)	25%	Exploratory laparotomy		Oct. 25, 1900
8369	J. H.	W.	36	Dec. 5, 1900	4553	Hæmorrhoids	35%	Suspension of uterus; Whitehead operation,		Jan. 5, 1901
8413	H. M.	W.	44	Dec. 29, 1900	4374 4589	Polypoid endometrium; gland hypertrophy	25%	First operation. Dec. 31, curettage; second operation, Jan. 10, hysterosalpingo-oöphorectomy	38% Jan. 6, 1901 42% Jan. 23, 1901 52% Feb. 4, 1901	Feb. 4, 1901
8907	M. S.	W.	56	July 6, 1901	5103	Adenocarcinoma of ovary with metastases	40%	Hysterosalpingo-oöphorectomy with removal of portion of omentum		Aug. 13, 1901
8934	L. P.	W.	40	July 20, 1901	5110	Submucous myoma	33%	Panhysteromyomectomy		Aug. 15, 1901
8936	S. A. B.	W.	36	July 22, 1901		Multiple uterine myomata; submucous myoma, menorrhagia, anæmia	15%		25% Oct. 2 45% Oct. 15	July 29, 1901
9070	Readmitted			Sept. 17, 1901			35%	No operation	35% Oct. 30	Oct. 31, 1901
8951	E. M.	W.	48	July 26, 1901	5128	Uterine myoma	35%	Vaginal hysterectomy (bisection)		Sept. 3, 1901
9002	E. B.	W.	22	Aug. 22, 1901	5173	Mild chronic endometritis, slight gland hypertrophy	40%	Curettage		Sept. 6, 1901
9004	M. W.	C.	49	Aug. 22, 1901	5223	Squamous-cell carcinoma of cervix; uterine myoma	33%	Vaginal hysterectomy, right salpingo-oöphorectomy		Oct. 15, 1901
9053	H. W.	W.	43	Sept. 11, 1901	5214	Uterine myoma	35%	Hysterosalpingo-oöphorectomy	37% Sept. 18 42% Oct. 2	Oct. 10, 1901
9139	O. G. C.	W.	26	Oct. 16, 1901		Pelvic inflammation; post-operative fæcal fistula; pulmonary tuberculosis	38%	No operation. (Pyometria evacuated in Suffolk, Va.; later abdominal operation, Norfolk, Va., March, 1900)		Oct. 31, 1901
9200	I. F. D.	W.	23	Nov. 7, 1901	5374 5376	Retained placenta Polypoid endometrium	37%	First operation, curettage; second operation, suspension of uterus, repair of outlet		Dec. 21, 1901
9266	E. C. H.	W.	47	Dec. 9, 1901	5460	Squamous-cell carcinoma of cervix	38%	Curettage		Dec. 30, 1901
9291	U. P.	W.	50	Dec. 24, 1901	5495	Uterine myoma, polypoid endometrium	22%	Panhysterectomy	25% Dec. 29, 1901 36% Jan. 14, 1902	Jan. 15, 1902
9312	F. S.	W.	55	Jan. 5, 1902		General peritoneal carcinosis	35%	Abdominal paracentesis. First, Jan. 9; second, Jan. 13; third, Jan. 17	30% Jan. 8	Jan. 17, 1902
9340	S. L. D.			Jan. 19, 1902	5537	Uterine polyp, moderate gland hyperplasia	29%	Hysterosalpingo-oöphorectomy		Feb. 17, 1902

TABULATION OF THE PATIENTS—*Continued*

Gyn. No.	Initials	Color	Age	Date of Admission	Path. No.	Diagnosis	Hæmoglobin on admission	Operation	Hæmoglobin after Operation	Date of Discharge
9558	C. J.	W.	21	Apr. 11, 1902	5749	Endometrium of pregnancy	35%	Curettage	75% May 26. 1902	June 19, 1902
9569	M. S.	C.	27	Apr. 17, 1902		Chronic pelvic inflammation; chronic interstitial nephritis	32%	No operation		Transferred to medical side
9570	M. H.	W.	48	April 19, 1902	5768	Adenocarcinoma of uterus, left tube and ovary; adenocystoma and carcinoma of right ovary	38%	Complete removal of pelvic structures	73%	May 17, 1902
9593	R. B.	C.	37	April 26, 1902	5839	Submucous myoma	10%	May 19. 1902, hysterosalpingo-oöphorectomy	14% April 28 17% May 9 23% May 16 21% May 23 28% June 1 37% June 11 45% June 27	June 28, 1902
9594	R. B.	W.	28	April 27, 1902	5783	Ruptured tubal pregnancy	37%	Removal of left tube and ovary		May 20, 1902
9629	B. H.	W.	27	May 12. 1902	5823	Uterine myoma	23%	Myomectomy	33% May 19, 1902	June 5, 1902
9638	M. W.		24	May 13, 1902	5824 5905	Submucous myoma	21%	May 15, vaginal myomectomy June 12, hysterosalpingo-oöphorectomy	27% May 23 30% June 1 45% June 11	June 10, 1902
9678	N. D.	W.	34	May 27, 1902	5965	Submucous uterine myoma with marked hyaline degeneration; mitral insufficiency, pericarditis, chronic interstitial nephritis	23%	Myomectomy with evacuation of pelvic abscess on right side	26% 45% Aug. 1	Aug. 31, 1902
9707	A. C.		42	June 9, 1902	5912	Uterine myoma; uterine polyp	26%	Hysteromyomectomy; double salpingo-oöphorectomy	30% July 1, 1902 42% July 14 55% July 20	July 23, 1902
9738	P. T.			June 20, 1902	5939	Uterine myoma; corpus luteum cyst	30%	Hysteromyomectomy, double salpingo-oöphorectomy		Aug. 5, 1902
9786	M. B.	C.	40	July 15, 1902	6065	Submucous myoma, tubo-ovarian abscess, follicular salpingitis	20%	Hysteromyomectomy; double salpingo-oöphorectomy	43% Aug. 26 50% Sept. 7 55% Sept. 12	Sept. 20, 1902
9878	E. D.	W.	29	Sept. 5, 1902	6091	Endometrium of pregnancy with proliferation of epithelium suggesting carcinoma	30%	Curettage		Sept. 22, 1902
9940	S. D.			Oct. 1, 1902		Pregnancy	40%	Ether examination only		Oct. 10, 1902
10001	F. H.	W.	22	Oct. 17, 1902	6167	Retained placenta	15%	Curettage		Oct. 22, 1902
10094	M. S.			Nov. 18, 1902	6280 6345	Chorio-epithelioma, multiple corpora lutea cysts of both ovaries	20%	Curettage; abdominal panhysterectomy	18% Dec. 5 22% Dec. 14 33% Dec. 29 50% Jan. 9 75% Jan. 23	Jan. 28, 1903
10097	F. E. R.		43	Nov. 20, 1902	6293	Menorrhagia, slight hyperplasia of endometrium	20%	Curettage	28% Nov. 28 39% Dec. 8 40% Dec. 16 50% Dec. 29 53% Jan. 8 60% Jan. 16 74% Jan. 23 81% Jan. 30	Jan. 31, 1903

10136	L. W.	W.	26	Dec. 11, 1902	6334 6348	Moderate hyperplasia of endometrium with thrombosis of veins of mucosa, right pyosalpinx	35%	Curettage; right salpingo-oöphorectomy, appendectomy	52% Dec. 21, 1902 60% Jan. 9, 1903	Feb. 6, 1903
10148	F. L.	W.	32	Dec. 25, 1902		Retained placenta	19%	Removal of placenta	22% Jan. 8 20% Jan. 11 22% Jan. 16 32% Jan. 19 45% Jan. 23	Jan. 23, 1903
10165	L. E.	W.	38	Jan. 4, 1903	6358	Menorrhagia; hyperplasia of endometrium	35%	Hysterectomy	20% Jan. 20 30% Feb. 10	Feb. 11, 1903
10170	G. G.	W.	27	Jan. 6, 1903	6359	Tubal pregnancy; endometrium of pregnancy	40%	Curettage; right salpingo oöphorectomy	30% Jan. 8 37% Jan. 10 45% Jan. 19	Feb. 6, 1903
10172	W. A. B.	C.	41	Jan. 6, 1903	6131	Uterine myoma	29%	Hysteromyomectomy; double salpingo-oöphorectomy	37% Jan. 13 38% Jan. 16 26% Jan. 20 37% Jan. 28 44% Feb. 3 40% Feb. 8 47% Feb. 23 53% Feb. 27	Feb. 28, 1903
10287	J. M. M.	W.	46	Feb. 25, 1903	6490	Uterine myoma	35%	Hysteromyomectomy; radical cure of hernia	40% Mar. 20, 1903	Mar. 21 1903
10291	M. F. N.		45	Feb. 26, 1903	6511	Uterine myoma	35%	Hysteromyomectomy		Mar. 25, 1903
10376	M. S.	W.	45	April 1, 1903	6596	Submucous myoma with hyaline changes (sarcomatous?)	30%	Vaginal myomectomy		April 17, 1903
10409	M. D.		37	April 13, 1903	6627	Relaxed outlet, retroposed uterus, slight hyperplasia of endometrium	38%	Curettage, repair of perineum, suspension of uterus	50% May 6	May 6, 1903
10455	E. D.		46	April 30, 1903	6670	Submucous uterine myoma	40%	Hysterosalpingo oöphorectomy; radical cure of hernia		May 23, 1903
10562	E. H.	W.	44	June 18, 1903	6803	Hyperplasia of endometrium with polypoid formation	35%	Abdominal panhysterectomy	45%	July 11, 1903
10573	K. H.	W.	27	June 22, 1903	6821	Cystic uterine myoma	38%	Multiple myomectomy		July 20, 1903
10597	N. B.		42	July 7, 1903		Submucous myoma	25%	Operation refused	35%	July 24, 1903
10605	A. E. M.	W.	38	July 13, 1903	6863	Uterine myoma, chronic pelvic adhesions	30%	Hysterosalpingo oöphorectomy	52%	Aug. 14, 1903
10618	E. C.			July 18, 1903	6847	Uterine myoma submucous	40%	Vaginal myomectomy		Aug. 5, 1903
10829	C. J.			Oct. 26, 1903	7030	Extra-uterine pregnancy	39%	Removal of tube	68% Nov. 22, 1903	Nov. 24, 1903
10838	S. S. H.			Oct. 29, 1903	7042	Carcinoma, body of uterus	40%	Panhysterectomy	45% Nov. 6 55% Nov. 24	Nov. 25, 1903
10849	M. E. M.	W.	40	Nov. 5, 1903		Squamous-cell carcinoma of cervix	18%	Inoperable		Nov. 17, 1903
10902	B. T.	W.	28	Nov. 24, 1903	7104	Menorrhagia, slight hyperplasia of endometrium	14%	Curettage	16% Nov. 27 20% Dec. 7 23% Dec. 13	Dec. 13, 1903
11049	D. E.	W.	28	Feb. 6, 1904	7272	Menorrhagia, hyperplasia of endometrium	25%	Curettage		Feb. 24, 1904
11077	L. E.		40	Feb. 23, 1904	7308	Uterine myoma	22%	Hysterosalpingo oöphorectomy	25% Mar. 8, 1904 29% Mar. 11 34% Mar. 15 40% Mar. 17 56% Mar. 25 78% April 3 80% April 7	April 7, 1904

TABULATION OF THE PATIENTS — *Continued*

Gyn. No.	Initials	Color	Age	Date of Admission	Path. No.	Diagnosis	Hæmoglobin on Admission	Operation	Hæmoglobin after Operation	Date of Discharge
11139	R. J.	C.	43	Mar. 24, 1904	7393	Uterine myoma, pelvic adhesions	25%	Hysterosalpingo-oöphorectomy	28% Mar. 29 25% April 3 28% April 5 29% April 19 40% April 25	April 30, 1904
11098	M. P.		42	Mar. 5, 1904	7310	Squamous-cell carcinoma of cervix	33%	Curettage		Mar. 23, 1904
11325	L. G.	W.	27	June 1, 1904		Prolapsed rectum	36%	Reduction of prolapsed rectum	60% July 15 75% July 25 90% Aug. 9	Aug. 9, 1904
11347	S. J. P.	W.	43	June 10, 1904		Menorrhagia	28%			Transferred to medical side June 12, 1904
11555	E. P.		53	Sept. 21, 1904		Large ovarian cyst	40%	Operation refused		Sept. 24, 1904
11278 11562	E. W.		31	Sept. 24, 1904	7805 7832	Chronic ulcer of cervix	40%	Curettage of cervix		Oct. 28, 1904
11652	M. C.			Oct. 26, 1904	7871	Acute endometritis	23%	Curettage	15% Nov. 13 18% Nov. 20	Dec. 7, 1904
11743	M. B.	C.	38	Dec. 5, 1904	8024	Submucous myoma	23%	Vaginal myomectomy	42% Dec. 16	Dec. 16, 1904
11750	S. G.		16	Dec. 12, 1904	8031	Glandular hyperplasia, polypoid condition of endometrium	35%	Curettage	40% Dec. 25 48% Jan. 2	Jan. 2, 1905
11762	S. C.		58	Dec. 17, 1904	8030 8040	Carcinoma of body of uterus and cervix	35%	Vaginal removal of portion of uterus	40% Jan. 3	Jan. 3, 1905
11764	C. V. E.		30	Dec. 19, 1904	8054	Acute salpingitis	28%	Double salpingectomy	38%	Jan. 9, 1905
11815	L. G. M.	C.	24	Jan. 17, 1905	8129 8148	Tubal pregnancy, decidual cast of uterus	28%	Right salpingo oöphorectomy	60%	Feb. 14, 1905
11830	R. B.	W.	23	Jan. 22, 1905		Ruptured extra-uterine pregnancy, encapsulated collection of blood in cul-de-sac	35%	Vaginal section, removal of blood clots	55%	Feb. 28, 1905
11889	L. V. G.			Feb. 13, 1905		Infected submucous myoma	14%	Partial vaginal myomectomy	20% Feb. 26 26% Mar. 17 60% April 9	April 11, 1905
11893	C. F.			Feb. 18, 1905		Retained membranes	40%	Curettage		Feb. 27, 1905
11919	G. H. O.			Feb. 27, 1905	8541	Adenomyoma, gland hypertrophy, Graafian follicle cyst, chronic pelvic adhesions	40%	Hysteromyomectomy; double salpingo-oöphorectomy	60% 70% May 17	May 17, 1905
11934	J. H.		37	Mar. 3, 1905		Inflammation of pelvic structures	30%	None	55% Mar. 14	Mar. 23, 1905
11750 12070	S. B. G.			April 23, 1905	8562	Hyperplasia of uterine mucosa with gland dilatation	40%	Curettage with cauterization of uterine cavity	48%	April 28, 1905
12086	A. H.		37	April 29, 1905		Uterine myoma	40%	Hysteromyomectomy, double salpingo-oöphorectomy	35% May 10 40% May 20	June 20, 1905
12234	E. W.		38	July 13, 1905	8844	Subacute inflammation of cervix, uterine myoma, glandular hypertrophy	25%	Hysteromyomectomy, double salpingo-oöphorectomy	45%	Aug. 26, 1905

12257	M. H.		47	July 26, 1905	8861	Sloughing submucous myoma	40%	Vaginal myomectomy	53%	Aug. 16, 1905
12456	A. M.		36	Oct. 20, 1905		Abscess occupying right side of abdomen, developing several weeks after labor	26%	Incision and drainage of abscess, suture of liver		Dec. 21, 1905
12890	E. W.		32	May 1, 1906	9839	Uterine myoma, Graafian follicle cyst and parovarian cyst	25%	Hysteromyomectomy, double salpingo-oöphorectomy	55% June 5, 1906	June 5, 1906
13344	E. N.		43	Oct. 30, 1906	10500	Polypoid endometrium, gland hyperplasia, pelvic adhesions	30%	Hysteromyomectomy, double salpingo-oöphorectomy	34% 1st day 34% 9th day 39% 16th day 41% 23rd day 48% 29th day 60% 38th day	Dec. 14, 1906
13376	E. F.			Nov. 13, 1906		Squamous-cell carcinoma of cervix	40%	Operation refused, although case very favorable		Nov. 18, 1906
13407	J. M.		42	Nov. 28, 1906	10586 10617	Adenomyoma of uterus, submucous myoma, acute endometritis, double pyosalpinx	40%	First operation, vaginal myomectomy; second operation, hysterectomy, double salpingo oöphorectomy	65%	Dec. 22, 1906
13545	K. F.			Jan. 29, 1907	10845	Carcinoma of cervix, uterine myoma, pyosalpinx	40%	Panhysterectomy, double salpingo-oöphorectomy		April 3, 1907
13564	M. B.	W.	38	Feb. 5, 1907		Abscess of left broad ligament	37%	Drainage of abscess	61%	Mar. 2, 1907
13601	L. S.	W.	24	Feb. 17, 1907	10932	Ovarian cyst, abscess of right broad ligament, general peritonitis, albuminuria	50%	Incision and drainage	32% 69% April 28, 1907	Apr. 28, 1907
13826	M. E.			May 9, 1907		Pelvic abscess	29%	Pelvic drainage	50%	May 26, 1907
13883	R. B.	C.	19	May 29, 1907	11385	Glandular hyperplasia	20%	Curettage	55%	June 18, 1907
13943	M. T.		39	June 21, 1907		Inoperable carcinoma of cervix	19%	None		June 25, 1907
13986	M. S.			July 6, 1907	11527	Squamous-cell carcinoma of cervix	40%	Exploratory laparotomy, freeing of adhesions, cervical curettage		July 27, 1907
14059	N. B.			Aug. 3, 1907	11662 11664	Slight hyperplasia of endometrium, cystic degeneration of ovary	40%	Hysterotomy with curettage, left oöphorectomy, cystectomy	35%	Aug. 27, 1907
14060	A. M.		39	Aug. 3, 1907	11837	Uterine myoma, adenomyoma, cystic degeneration of ovary	35%	Panhysterectomy, double salpingo-oöphorectomy	62%	Aug. 26, 1907
14247	S. W.		40	Oct. 4, 1907	11904	Double hydrosalpinx, uterine myoma, chronic endometritis	30%	Hysterectomy, double salpingo-oöphorectomy	36%	Oct. 25, 1907
14458	C. S.		46	Dec. 27, 1907	12167 12181	Uterine myoma, chronic salpingitis, oöphoritis, chronic endometritis	20%	Hysteromyomectomy, salpingo-oöphorectomy		Feb. 4, 1908
14503	M. R.			Jan. 17, 1908	12291	Glandular dilatation, cystic degeneration of ovaries, chronic salpingitis	38%	Hysterectomy, double salpingo-oöphorectomy	42% Feb. 4 46% Feb. 9	Mar. 27, 1908
14544	M. S.		17	Feb. 3, 1908		Amenorrhœa, infantile pelvic organs, chlorosis	30%	Ether examination only	40%	Feb. 24, 1908
13883 14698	R. B.	C.	19	Apr. 15, 1908	12464	Gland hyperplasia	15%	Curettage	37% April 25	May 9, 1908
14801	S. A.		25	May 17, 1908		Bleeding since birth of child, retained membranes	17%	Not treated		Transferred May 9, 1908
13211 15226	S. S.	C.	20	Oct. 23, 1908	13155	Ruptured tubal pregnancy	35%	Resection of left uterine cornu, suture of outer coat of rectum, release of intestinal and omental adhesions		Nov. 8, 1908
15245	C. L. B.	C.	33	Oct. 31, 1908	13160	Ruptured tubal pregnancy	35%	Right salpingectomy		Nov. 18, 1908

TABULATION OF THE PATIENTS—*Continued*

Gyn. No.	Initials	Color	Age	Date of Admission	Path. No.	Diagnosis	Hæmoglobin on admission	Operation	Hæmoglobin after Admission	Date of Discharge
15542	E. J.	C.	23	Feb. 20, 1909	13486 13531	Tuberculosis of endometrium, myoma, normal tubes, cystic ovary, chronic appendicitis	21%	Hysterectomy, double salpingectomy, left oöphorectomy. Appendectomy		Mar. 9, 1909
15745	C. L.		30	May 6, 1909	13785	Chronic endometritis	21%	Curettage		May 15, 1909
15838	P. M.	W.	33	June 19, 1909	13829	Hypertrophy of cervix	30%	Amputation of cervix, (post-operative hæmorrhage from cervix), repair of relaxed vaginal outlet		July 16, 1909
15935	M.A.W.		36	Aug. 3, 1909	14069	Uterine myoma, retained membranes	34%	Curettage		Aug. 15, 1909
16001	L. M.		28	Aug. 30, 1909	14157	Uterine myoma, normal cervix, left hydrosalpinx, pyosalpinx	40%	Hysteromyomectomy, bilateral salpingo-oöphorectomy, release of adhesions		Sept. 17, 1909
16010	L. B.		39	Sept. 3, 1909	14159	Early adenomyoma, bilateral chronic salpingitis	40%	Panhysterectomy, myomectomy, double salpingo-oöphorectomy		Sept. 18, 1909
16104	K. M.	W.	31	Oct. 11, 1909	14222 14365	Squamous-cell carcinoma of cervix, chronic bilateral salpingitis	39%	Panhysterectomy, double salpingo-oöphorectomy, suture of bladder	50% Oct. 24 54%	Nov. 13, 1909
16264	S. H.	C.	24	Dec. 9, 1909	14496	Metrorrhagia, retroposition of uterus, bilateral cystic ovaries, small corpus fibrosum, chronic appendicitis	35%	Resection of corpus fibrosum, puncture of cyst, appendectomy		Dec. 28, 1909
16290	F. F.	C.	30	Dec. 28, 1909	14557	Tubo-ovarian abscess, chronic bilateral salpingitis, oöphoritis	35%	Panhysterectomy, bilateral salpingo-oöphorectomy, release of intestinal adhesions		Jan. 17, 1910
16294	A. S.	W.	29	Dec. 30, 1909	14673	Acute pelvic inflammation	38%	Pelvic section, opening of old drainage tract		Feb. 19, 1910
16296	M. B.	C.		Dec. 30, 1909	14556	Ruptured tubal pregnancy, ovarian cyst	25%	Left salpingectomy, resection of cyst wall		Mar. 5, 1910
16333	G. G.	C.	33	Jan. 17, 1910	14579 14018	Polypoid endometrium, chronic appendicitis	20%	Curettage, exploratory laparotomy, release of adhesions	33%	Feb. 8, 1910
16405	A. B.		36	Feb. 17, 1910	14751	Pedunculated submucous myoma	15%	Vaginal myomectomy		Mar. 6, 1910
16494	M. W.		30	Mar. 21, 1910	14840	Tubo-ovarian abscess, chronic salpingitis, endometritis, cystic left ovary	40%	Hysterectomy, bilateral salpingo-oöphorectomy, appendectomy		April 7, 1910
16603	E. S.	W.	35	April 30, 1910	14989	Adenomyoma (diffuse), uterine polypi, cervicitis, chronic appendicitis	40%	Hysterectomy, myomectomy, right salpingo-oöphorectomy, appendectomy		May 26, 1910
16615	H. H.		30	May 5, 1910	14992	Extra-uterine pregnancy	40%	Right salpingectomy	75%	May 27, 1910
17080	M. W.		47	Oct. 31, 1910	15606 15669 15701	Adenocarcinoma of cervix	28%	First operation cauterization and curettage; second operation, panhysterectomy, double salpingo-oöphorectomy		Dec. 10, 1910
14544 17322	M. S.	W.	46	Feb. 13, 1911	16063	Amenorrhœa, retroposition of uterus, pulmonary tuberculosis, small mediastinal tumor, chronic appendicitis	30%		68%	Transferred to medical side Feb. 18, 1911
16341 17244	F. P.		31	Jan. 13, 1911	15827 15915	Gland hyperplasia, chronic appendicitis	40%	Curettage, suspension of uterus, repair of relaxed vaginal outlet, appendectomy		Feb. 4, 1911

17377	L. C.	C.	36	Mar. 18, 1911	16000	Pelvic melanotic sarcoma with ascites (origin?)	40%	Exploratory laparotomy		Mar. 28, 1911
17438	C. W.	C.	24	April 13, 1911		Ruptured extra-uterine pregnancy (right)	23%	Right salpingo oöphorectomy		April 20, 1911
16846 16869 17609	I. M.	W.	48	June 28, 1911		Squamous-cell carcinoma of cervix	30%	Curettage and cauterization		July 7, 1911
18030	N. F.		27	Dec. 5, 1911	16787	Polypoid endometrium, decidual cells	35%	Curettage		Dec. 11, 1911
18034	N. M.		27	Dec. 6, 1911	16776	Chorio-epithelioma	40%	Curettage	45%	Dec. 15, 1911
18073	R. L. B.		23	Jan. 2, 1912		Retained membranes	30%	Curettage	40%	Jan. 13, 1912
18153	A. W.		49	Feb. 10, 1912		Squamous-cel ℓcarcinoma of cervix	12%	Cauterization with actual cautery		Feb. 21, 1912
18185	S. E.	C.	45	Feb. 23, 1912		Uterine myoma	25%	Hysteromyomectomy, double salpingo-oöphorectomy		Mar. 10, 1912
18333	M. B.	C.	39	April 24, 1912		Squamous-cell carcinoma of cervix	35%	Cauterization of cervix		May 5, 1912

sides, further on the left. The left iliac vein was thrombosed. The growth resembled placental tissue. There were metastases in both lungs ranging from the size of a hazelnut to a tangerine orange. The liver showed fatty changes. The kidneys showed chronic parenchymatous degeneration, the spleen marked amyloid changes. There was emphysema of the lungs, œdema of the left leg, bilateral hydro-ureter, hydronephrosis, acute peritonitis, pleuritis and gastric erosion. In this case, of course, the operation was at best but a palliative procedure.

I have purposely given the briefest outline of our findings, as practically all the essential points are given in the tabulation of cases.

DEDUCTIONS

From the foregoing it is clearly evident that, as a rule, patients with a relatively low hæmoglobin stand pelvic or abdominal operations fairly well. Where carcinoma of the cervix or body of the uterus exists, however, the dangers are materially increased.

In those cases in which the bleeding is limited entirely to the menstrual period it is well to defer operation until a few days before the next period in order to raise the percentage of hæmoglobin to the maximum.

Hyperplasia of the endometrium is a definite disease. The bleeding caused by this condition often leads to a low hæmoglobin index, which can be temporarily checked by curetting. Sometimes after two or three curettings in the course of a year the excessive flow ceases. In other cases it is necessary to remove the body of the uterus.

I cannot emphasize too strongly the necessity of becoming thoroughly familiar with the technique of transfusion. This procedure, as simplified by Bernheim, can be readily employed by any surgeon and should not require more than 20 minutes to half an hour. Transfusion will certainly in the near future become a routine procedure in cases in which operations are required on patients with a very low hæmoglobin. It is hardly necessary to draw attention to the inadvisability of employing any but the mildest cathartics after operation on such patients. I recently heard of a patient who, notwithstanding a hæmoglobin below 20 per cent., weathered a severe abdominal operation. A day or two afterward she was given calomel and salts and promptly died. The after-treatment of these cases requires the greatest care.

THE CONDUCT OF PREGNANCY AND LABOR IN ACUTE AND CHRONIC AFFECTIONS OF THE HEART[1]

SURGICAL OPERATIONS IN ACUTE AND CHRONIC AFFECTIONS OF THE HEART

THIS ARTICLE IS A SUMMARY OF THE AUTHOR'S VIEWS, BASED UPON HIS OWN EXPERIENCE

BY J. CLARENCE WEBSTER, M. D., CHICAGO

PREGNANCY. (*a*) Acute cardiac affections are rare in pregnancy and must be regarded as very serious. In the early months the patient should be kept at rest and treated medically. After a few weeks of improvement the uterus should be emptied. It would be very inadvisable to allow the pregnancy to advance until viability of the fœtus, because of the small likelihood of having a healthy heart muscle or well established compensation. The risk of pulmonary œdema and over-dilatation of the right side of the heart would be very great. The induction of abortion at the onset of the acute disease should not be considered because of the extra strain which would be thrown on the heart.

An acute valvular lesion or myocardial degeneration occurring in the advanced months presents a situation of the most serious character. Establishment of compensation or recovery of the heart muscle cannot be expected before term, and it is a question as to which is the more serious procedure: to interrupt pregnancy at the very onset of the disease, or to await the natural termination. The author's preference is for the former.

(*b*) We are far more frequently consulted in regard to pregnancy occurring in women with old cardiac disease. In the interests of the mother, I believe that the best advice in such cases is that pregnancy should not be allowed to occur, and that if it has taken place, it should be terminated. The effects of gestation in cases of old myocardial degeneration or valvular lesion vary markedly, depending upon such factors as the site and extent of the disease, the general health, habits and occupation of the patient, the degree of compensation, etc.

If anæmia or poor health from other causes exists, the cardiac trouble is likely to be aggravated. In vegetative endocarditis, fresh fibrin deposits may form on the diseased valve from the increased hyperinosæmia of the blood of the pregnant woman.

The organ may suffer especially in the advanced months from the extra work due to the increased quantity of circulating blood.

Abnormal size of the uterus due to a large fœtus, twins, or excessive liquor amnii increases the strain. Disorders of the alimentary tract by causing abdominal distention or by causing toxæmia may have a bad effect on the heart muscle. In some cases the heart bears up so well under the extra strain and risks of pregnancy that the patient may be disturbed no more than under normal conditions. Moreover, this experience may be repeated in successive pregnancies. These cases are, however, the exception.

It is a safe generalization that a woman with a definite chronic lesion, e. g., valvular or myocardial degeneration (I am not referring to cases diagnosed as such simply because a functional or temporary murmur is heard), has *cæteris paribus*, a shorter life expectancy if she passes through pregnancy and labor than if she does not, and the risk is increased in proportion to the frequency of the pregnancies.

The most serious cases are those in which the myocardium is degenerated tending to cause cardiac dilatation, or in which after former valvular disease compensation has not been thoroughly established. Right-sided affections are so rare as to call for no special mention. Mitral lesions are more frequently found than aortic. The latter is

[1] Read before the American Gynecological Society, at Washington, D. C., May 7, 1913.

very serious if of recent occurrence. Ot well compensated cases it is generally held that mitral stenosis is most to be feared, especially when it is associated with regurgitation.

It is scarcely necessary to specify the well-known signs and symptoms of cardiac failure. They are usually less common and less marked in old aortic than in old mitral disease and tend to appear later in gestation. In mitral stenosis they usually develop after mid-term but may do so before that time, the most important being pulmonary congestion and œdema, weakness and dilatation of the right side of the heart. The health of the fœtus may be impaired from imperfect oxygenation of the maternal blood, as well as from destruction of placental tissue by hæmorrhages. Premature emptying of the uterus may take place.

Death of the mother may occur apart from the latter, though in most cases it is associated with this event or follows it. If a patient with old cardiac disease becomes pregnant and desires to run the risks of trying to go to term, she should be put on the strictest régime and should be protected from all mental or physical strain, care, shock, exposure to chills, dampness and infections. Special care should be given to the care of the skin, kidneys, and alimentary canal. If the patient's condition be perfectly satisfactory, medicines are not necessary; though some advise as a rule digitalis or strophanthus in the last months. These drugs are of course to be administered if the slightest sign of heart failure appears.

If abortion or premature labor threatens, what course is to be followed? My advice is to follow the indication and empty the uterus. If the patient persists in wishing to prevent the loss, she must be put to bed and the usual conservative measures be carried out.

If signs of cardiac failure, e. g., dyspnœa, palpitation, œdema, cough, etc., develop without signs of premature emptying of the uterus, I believe it is best to keep the patient in bed on treatment calculated to improve the heart, waiting for a period of improvement to again advise artificial termination of the gestation. If no improvement occurs and marked signs of cardiac failure develop, the patient's condition is desperate whether the uterus be emptied or not.

Labor. When labor pains begin, the first stage should be conducted as in normal cases, the patient being encouraged to avoid straining. After dilatation of the cervix and rupture of the membranes, the efforts at expulsion add additional burdens on the heart. In order to reduce these to a minimum it is advisable to anæsthetize the patient and deliver by forceps, or, sometimes, by version. During this procedure it is advisable to administer nitrites, either giving nitrite of amyl by inhalation, or nitroglycerine or erythrol tetranitrate hypodermically. These drugs lessen the strain on the heart by increasing the quantity of blood in the peripheral vessels through paralysis of the muscular fibers or of the vasomotor nerves in the walls of the arterioles.

After the delivery of the child follows a more dangerous period. The reduction in size of the uterus by retraction means additional strain on the heart owing to the rapid closure of the uterine circulation. In many cases death has occurred during or immediately after the third stage owing to overdistention of the right side of the heart.

It is advisable that the placenta be gradually detached by the fingers introduced into the uterus. If the right side of the heart be embarrassed, this procedure should be carried out so as to allow of free loss of blood to relieve the circulation. During this period the administration of nitrites is also helpful.

If strong contractions do not occur in the uterus no alarm need be felt. The organ may easily be compressed between the hands and stimulated if necessary. The hot douche, pituitirin or ergotin should not be used save where there is danger of too great blood loss. In the old days it was very common to bleed the patient from the arm or neck. This procedure is unnecessary when we have at our disposal the simple procedure of separating the placenta and bleeding from the uterus which I have just described.

OPERATIONS IN ACUTE AND CHRONIC AFFECTIONS OF THE HEART

Surgical procedures should be avoided in active or recent valvular disease, dilatation, or myocardial degeneration except in conditions of extreme emergency. General anæsthesia may greatly increase risk by causing straining, coughing, vomiting, respiratory embarrassment and asphyxiation. If there be orthopnœa the patient should be semi-recumbent, and chloroform should never be employed. Ether is generally advisable except where there is pulmonary œdema or bronchitis. Pure nitrous oxide is contra-indicated. If it be administered with oxygen, it is one of the safest anæsthetics in such cases. Hewitt, of London, one of the leading authorities on anæsthesia, is a strong advocate of the A. C. E. mixture in bad heart disease. He believes it to be the best anæsthetic where emphysema and bronchitis coexist with fatty degeneration and dilatation of the heart.

The author has performed various minor and major operations in incompensated valvular disease with local infiltration anæsthesia, using Schleich solution (No. 2) or novocaine (1 in 200) without untoward results. Among these have been abdominal and vaginal Cæsarean section, resection of the gut in strangulated hernia, and drainage of an infected gall-bladder. In some instances the local anæsthesia has been combined with gas and oxygen administration.

In all cases in which a general anæsthetic is employed, it is of the utmost importance that the administration should be slow, asphyxiation being avoided and respiration kept free. It is advisable that 1–6 to ¼ grain of morphine and 1–100 grain of atropine should be given hypodermically half an hour before operation.

In slight cardiac affections, or where compensation is well established, the rules which guide the anæsthetist in normal cases are to be observed.

The Trendelenburg position should never be used where heart disease exists unless compensation is good and circulatory and respiratory conditions are satisfactory. When employed, it should be very gradually established and only to a moderate extent. Too sudden lowering of the patient's chest is apt to embarrass the right side of the heart. Forcible pressing of the viscera toward the diaphragm with packs must be avoided because of mechanical interference with the diaphragm and of forcing blood from the abdominal veins to the right heart, thereby putting additional strain on the latter.

THE CONDUCT OF GYNECOLOGICAL OPERATIONS IN THE PRESENCE OF CHRONIC AFFECTIONS OF THE HEART[1]

By EDWARD REYNOLDS, M. D., Boston

I MUST ask you to remember that throughout this communication I am restricting myself to one single point in the subject, which may be defined as the question to what extent operations of choice rather than of necessity, i.e., those which are concerned with the improvement of health, rather than with the saving of life, should be regarded as contra-indicated by chronic cardiac disease. Secondly, I wish to ask you to remember that the very brief time allowed by our regulations to a communication which is part of a symposium is my excuse for a brevity of form which would appear mere dogmatism if it be not remembered that it is intended simply as a concise statement of personal opinion, as a communication to a discussion, and so constructed in the hope of eliciting replies and criticisms.

Nothing is more striking in a discussion of cardiac cases with expert internists than the emphasis which they lay upon the statement that in the vast majority of all such cases the symptoms which the patient presents, and the degree of exertion which may be permitted to him, are far more dependent upon the state of the cardiac muscle and the degree of compensation than upon the individual lesion which may be present.

Similarly the propriety of a surgical operation is to be decided by reference to the amount of symptomatology which the case presents under the ordinary exertions of daily life.

"Modern surgery disturbs the vital processes extremely little." That very wise surgeon, the late Maurice H. Richardson, constantly framed for himself precepts which may be spoken of as crystallized experience, and the above sentence, which was one of his last, has seemed to me more true and more valuable with every day that has gone by since he told it to me. "Modern surgery disturbs the vital processes extremely little," or, to paraphrase the application of this to a case with cardiac lesions: An operation done under the best conditions of modern surgery may be regarded as the equivalent of a very moderate unusual exertion. The degree of that exertion varies, of course, to some extent with the severity and duration of the proposed operation, but my point is that under the conditions specified no ordinary operation should be regarded as involving more risk than that involved in a moderate extra muscular exertion. As the nearest feasible approach to a tangible standard, and with the understanding that I put it as no more than that, I would further define my position as a belief that a subject of valvular or other cardiac disease who is able to go up a flight of stairs at an ordinary walk without provoking more than slight breathlessness is fitted to endure an abdominal operation of average grade without suffering any grave increase of the ordinary risks, provided the other conditions to be spoken of are what they should be, namely: I think that the prognosis in these cases depends upon the class of care taken of them, and that care should include expert medical treatment both before and after operation; thoroughly expert anæsthesia; and rapid, gentle operating.

Successful surgery is usually the result of thoroughly organized team work.

When it is a question of an attack on a doubtful or trying case there is every difference between the position of the occasional operator with occasional assistants and that of the metropolitan surgeon with every appliance and form of assistance at his command. Cases which the one should not attempt the other may often do fearlessly, as a result of his equipment, even more than of his personal equation.

The medical care given to a doubtful cardiac case both before operation and after convalescence should, I think, be better than

[1] Read before the American Gynecological Society Washington, D. C., May 7, 1913.

that which most surgeons are capable of giving. The case should be seen in consultation at the outset by a trained internist and should remain under his care, either direct or supervisory, until about two weeks after operation. The surgeon must necessarily assume the greater part of the responsibility of a decision to operate, but I think that he will be wiser and his patient be safer if in making that decision he accepts the opinion of the medical expert as to how much muscular exertion may safely be permitted to the individual case, and combines that with his own opinion as to the correspondence between the given operation and the amount of muscular exertion so permitted. The surgeon should also depend upon the trained senses of the internist to tell him whether the case is at the given moment in the best condition to which she can be brought by medical care, and should decline to operate until that point has been reached. A time when there is the least shade of acute overstrain is the last time when any athletic exertion, or operation, should be permitted. Again, the internist should not only bring the heart to the best condition before operation, but with his trained familiarity with cardiac cases should also watch and guard the heart during the early part of the convalescence. If the patient returns to bed in good condition, her time of greatest danger from cardiac cause is at the end of a week to ten days, or at least that has been my experience; and if during the intervening days the heart is carefully watched, its least weakening noted, these secondary dangers can usually be forestalled and need be but little dreaded.

The anæsthetist who is to take his share of the responsibility in such a case should also be a trained expert, one who is qualified by experience and study to judge for himself of the surgical resistance of the given heart and of the given patient as a whole, who is familiar with all of the accepted methods of anæsthesia. In my opinion such a man should be asked to see the patient in consultation either with the surgeon or the internist at the outset of the case, and should take his due share in the decision as to the amount of danger involved, and in the selection of the method of anæsthesia. He should be introduced to the patient as an expert and should have every opportunity to make as full an examination, or as many examinations, as he may desire, precisely as any other expert should be treated.

From the standpoint of operative technique the surgeon who is to operate upon a cardiac case should in my opinion select from among the several methods of operation that one of all those that will give satisfactory results, which he thinks can be carried to a conclusion most rapidly and with the least violence. In cardiac cases rough, slow operating is especially dangerous.

When circumstances are such that the class of care here outlined can be given to the patient, I believe that there are but few cases in which any ordinary operation which is clearly indicated cannot be carried out.

The degree of risk which may be taken, i.e., the degree of cardiac symptomatology which may be disregarded in deciding upon an operation, will, however, vary of course not only with the severity of the operation, but in proportion to the acuteness of the indication. There is no way perhaps in which one's position upon the varying risks and indications involved in this point can be defined so clearly, within the limits of a brief article, as by the citation of a typical case or cases.

CASE 1. P. R. Series B. 3456, November 7, 1911. Multipara, 60 years old, patient of Dr. William H. Robey, Jr. Suffering from pain in both lower quadrants of the abdomen, bearing down sensation and pruritus, says she is unable to walk freely on account of protrusion from the vulva. On examination practically complete prolapsus uteri et vaginæ. Has been short of breath for about two years, worse for about one year and especially during last three months. Has recently lost twenty pounds in weight. Dr. Robey, an internist of authority, pronounces both sides of the heart dilated, considers the heart an unusually poor one, and thinks the prospect of the patient's living any great length of time under any circumstances is poor. He states, however, that her pelvic condition causes her great discomfort, and he believes so far increases the exertion incident to ordinary locomotion, even about her house, as to impose a considerable extra load upon her heart. He brings her to the office with little idea that operation will be recommended and really in the hope of relief from minor treatment. The pulse is irregular and intermittent, slight exertion in attempting to move a little rapidly, even about the room, brings on perceptible

cyanosis, and the patient says that she is much of the time unable to lie down at night. In view of the severe cardiac symptoms, the poor prospect of duration of life under any conditions, and the amount of time necessarily involved in a prolapse operation, immediate operative treatment was plainly inadvisable.

Patient was supplied with a Worcester pessary, one in which a large doughnut pessary is attached to a stem, and this to perineal supports and an external belt. Uncomfortable as such an apparatus is, it greatly decreased her difficulty in walking, and it was agreed with Dr. Robey that if the heart improved under medical treatment and this decrease of load the operative question might be taken up again.

Just one year later, in November, 1912, Dr. Robey wrote that the patient's cardiac condition had improved very greatly and that she was becoming intolerant of the discomforts of the pessary. He was now inclined to request operation. She was seen by Dr. A. R. Kimpton, a rising surgeon but still an occasional anæsthetist, in consultation with Dr. Robey. At this time she was able to go about town shopping, her pulse was regular and of about 100, and she was able to go up a flight of stairs fairly rapidly without dyspnœa. Dr. Kimpton believed the heart safe for the administration of ether by the open or drop method, and after seeing the patient I was glad to concur in the expediency of an operation, which was done on January 15, 1913. The much elongated cervix was amputated, high, and extensive cystocele and perineum operations were done, the whole procedure occupying over forty minutes. The heart rate was about 100 at the beginning of operation and remained regular at that rate throughout; but the blood pressure, which was 170 at the beginning, fell slowly but steadily until within the last five minutes of the operation, when it dropped rapidly to 120 and the peripheral circulation became poor, but improved under a single hypodermic of strychnia. Dr. Robey guarded the heart with small doses of digitalis and ordered hypodermic strychnia on several occasions when the circulation was less good than usual. There were no other happenings and the patient made a good recovery.

Case 2. P. R. Series B. 2691, February 12, 1907, patient of Dr. J. E. Garland of Gloucester. Single woman, 70 years old. On palpation the whole lower abdomen is occupied by a new growth which rises well above the umbilicus. On vaginal examination the growth is plainly uterine, thoroughly movable, and divided into several large lobulations. There is a history of frequent leakings of pinkish serum and this, in connection with the elastic consistency of the mass, warrants a suspicion that its character is adenomatous. The patient states that she has had a valvular lesion of the heart since early life and has of late become increasingly short of breath. She is now unable to cover a flight of stairs at any gait on account of severe breathlessness and cyanosis, but gets along fairly well upon the level. The size of her abdomen had increased rapidly within the last few months and she thinks that the dyspnœa has increased at a corresponding rate.

Seen in consultation by Dr. John B. Hawes, internist, who reports a dilated heart with both sounds replaced by to-and-fro murmurs. Pulse rapid and varies from 120 to 144. Dr. Hawes is of opinion that the dilatation of the heart is largely due to the load furnished by the large new growth, and that no considerable or prolonged improvement can be expected from any medical treatment.

Patient next seen by Dr. F. E. Garland, anæsthetist, who considers any anæsthesia decidedly dangerous but ether by the open method the least dangerous. The indication being regarded as absolute, on account of the probability of malignancy, the conditions of the case promising the possibility of a rapid operation, and the patient being ready to take any risk, she was anæsthetized four days later, on February 16, at which time Dr. Hawes, who had been in charge, believed that the heart had been brought to the highest point of efficiency which could be attained previous to operation. Under the agitation incident to the preparations for operation the patient's heart became so rapid and excitable that it could not be counted and some courage was required to begin the administration of ether, but before the patient was fairly unconscious the pulse had fallen, under the stimulus of primary ether, to about 72, regular and of improved quality. A rapid incision disclosed multiple fibromata of the uterus and an adeno-carcinoma of the ovary the size of a fœtal head. There was no secondary involvement, the broad ligaments and infundibula were long and flexible, the conditions of the case permitted an unusually rapid, total hysterectomy, and the operation was concluded with the pulse still regular and below 100, though its quality had become poor with the removal of the tumor. A quart and a half of salt solution was left in the abdomen and the patient put to bed in good condition. Her recovery was absolutely uneventful, her pulse remaining throughout better than before operation, and with the exception of a little strychnia Dr. Hawes gave her no treatment.

"Modern surgery disturbs the vital processes extremely little," and successful surgery is the result of team work. If the risks are estimated by the symptomatology and if the surgeon is able and willing to give his patient all the advantages of modern treatment, it is surprising how seldom a chronic cardiac lesion will contra-indicate a needed operation.

THE CONDUCT OF GYNECOLOGICAL AND OBSTETRICAL OPERATIONS IN THE PRESENCE OF ACUTE AND CHRONIC ENDOCARDITIS[1]

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IN gynecological surgery the heart plays an important rôle, contributing to the success or failure of an operation. Anæsthesia, hæmorrhage, shock, persistent nausea or vomiting, infection and abdominal distention, etc., all have an unfavorable influence on the action of the cardiac muscle.

Gynecological operations in patients who are suffering from cardiac disease may be done, provided compensation can be established and the strain of operation minimized. Pronounced secondary anæmia from fibroidal disease or other causes has its effect on the heart muscle, producing myocardial and vessel changes. The hepatic and renal functions are consequently disturbed. These may be corrected by tonics, air, diet, transfusion, exercise, etc. The writer has yet to meet a fibroid demanding operation, which cannot be removed in the presence of cardiac disease. We have come to consider that *symptoms, not lesions, are important.* Each case should be studied individually in conjunction with a competent internist and the cardiac balance re-established, and the liver and renal efficiency restored, before operation is undertaken.

The sheet anchor of the pre-operative treatment should be rest, with the judicious use of morphia and heart tonics, especially strophanthus and digitalis or its derivatives, the correction of digestive errors, the restriction of fluid until all œdema has disappeared, and the careful observance of the blood pressure. We have operated with the hæmoglobin as low as twenty and a blood pressure of but eighty. This only shows what can be done, not what should be the rule. Expert anæsthesia, rapid operating, absolute hæmostasis and handling the abdominal viscera as little as possible are the general factors which contribute to success in cardiac cases. Speed and hæmostasis diminish the shock, while a small amount of anæsthetic and the avoidance of intestinal manipulation prevent distention, paresis and gastric dilation.

Ether-oxygen vapor given by an expert is the anæsthetic of choice. The narcosis should be preceded by a hypodermic of ¼ gr. of morphine, given one half hour before beginning the anæsthetic; this allows for perfect oxidation, with a minimum amount of ether. Posture has much to do with embarrassing the respiration and heart action during the operation, which again increases the amount of ether used. A prolonged use of the Trendelenburg position is apt to be associated with cyanosis.

The heart is embarrassed during anæsthesia when the patient is in the Trendelenburg position, as the blood pressure in the lungs is increased. Forcible pressure upon the abdominal viscera and struggling also produce interfered-with respiration and cyanosis. The last two may be prevented by a properly administered anæsthetic, preceded by a sufficient amount of morphine.

The Trendelenburg posture allows an excessive amount of blood to return to the heart, produces cyanosis and thus requires a larger amount of ether, all of which subjects the heart to greater strain.

The anæsthetic in heart cases should be begun in the semi-recumbent posture and preceded by a preliminary dose of morphine. The ether should be administered slowly and cautiously so that the patient may be put to sleep without cyanosis or struggling. Asphyxia of any degree produces a rapid dilation of the right heart.

For pelvic tumors we place the patient in the Trendelenburg posture only long enough to have the field of operation perfectly isolated with gauze pads. The table is then slowly lowered and broken in the center to allow the shoulders to be slightly raised; this gives a

[1] Read before the American Gynecological Society, Washington, D. C., May 7, 1913.

greater relaxation of the abdominal muscles, consequently greater facility is secured for work in the pelvic field. This muscular relaxation may be even more increased by local infiltration anæsthesia of the site of the incision with a one-fourth per cent novocaine solution.

By using local anæsthesia for the skin, muscles and fascia, the operation may be well advanced before the ether narcosis is actually obtained. This does two things which are of great advantage to the patient; i. e., necessitates the use of a smaller amount of ether and diminishes the shock on the anoci-association theory of Crile.

The control of hæmorrhage is all important. Blood clot makes the best culture medium for bacteria. In the peritoneum, blood accumulations act as the starting point of peritonitis and adhesions. Peritonitis is always attended with more or less paresis. Hæmatomata are apt to become infected and increase the morbidity of the operation, all of which has its effect on the heart muscle. When the size of the tumor admits, the vaginal route should be elected, as giving less shock and post-operative sequelae though the peritoneal toilet is never so finished as when operating by the abdominal route.

We advise and practice the removal of tumors between clamps, which is rapid and without blood loss. We then isolate the main vessels and ligate them individually with fine silk or catgut. All cellular oozing is checked by running the peritoneal edges together, leaving only a smooth peritoneal surface. A dry, smooth peritoneum is the best prophylactic against adhesions, infection and ileus.

If the tumor removed is a large one, the abdomen should have firm support and compression to compensate for the lowered intra-abdominal pressure, otherwise an increased load is thrown on the right heart by the dilation of the arteries, and the retention of blood in the abdominal capillaries and veins. Should cyanosis occur, blood-letting by phlebotomy and prompt cardiac stimulation with camphor and digalin will usually re-establish the balance. The semi-recumbent posture contributes to the patient's comfort. Vomiting and intestinal or gastric distention are the most frequent embarrassing complications which disturb the heart's action; so should be guarded against.

In our experience, post-operative distention may be avoided by, first, careful pre-operative preparation of the intestinal canal. This is done by exhibiting on the second day before operation Ol. ricini oz. i, Tinct. opii camp. drs. ii, and giving an enema the night before. From the time of taking the castor oil, the patient's diet is restricted to strained cereal, or strained soup, or orange juice, with milk sugar; should the bowels move too freely, sufficient deodorized tincture of opium is given to check any diarrhœal tendency. Lactopeptin grs. x., with soda bicarb. grs. x, precedes each nourishment. Secondly, following the operation in heart cases, *the intestines should be allowed absolute rest for twenty-four to thirty-six hours;* saline enemata, proctoclysis, etc., all tend to make distention and should, if possible, be omitted. By the mouth, water plain or fruit juice with milk sugar may be allowed. Small doses of morphia $_1{}^1{}_2$ or more, q. 4 h, tends to keep the patient quiet, and acts as an efficient heart stimulant. A hard rubber rectal syringe tip may be left in the anus to allow the escape of gas. Don't have a "fussy" nurse in charge of a heart case.

Should distention occur in the lower abdomen, it may be relieved by enemata of soap suds, milk and molasses or saline and glycerine. When in the upper portion of the abdomen, by lavage. Gastric distention displaces the diaphragm and heart upward, produces cyanosis and thus embarrasses the cardiac function, not only by pressure but by poisoning the muscle, and right heart engorgement. Gastric distention should always be relieved by the stomach tube. Don't withhold it too long for fear of the strain produced by its passage; this is the lesser of the two evils.

Cardiac support is given as required by strychnia, strophanthus and digitalis. Morphine is the most dependable, especially in the presence of stenotic lesions, or combinations of them. The cardiac patient gets physical and mental repose from morphia and experience has taught us that most hearts tend to balance themselves, if given time.

To summarize our experience in gynecological operations we may state:

First, that pelvic conditions necessitating operation may be done after proper cardiac preparation.

Second, that the cardiac symptoms, blood pressure and the functional activity of the liver and kidneys, are the only indices of when it is time to operate.

Third, that these cases should always be seen and treated in conjunction with a competent internist.

Fourth, the operation should be rapid, bloodless and done under combined local and general anæsthesia, novocaine, morphine, ether-oxygen.

Fifth, that the Trendelenburg posture should be used only until such time as the field may be properly isolated, when the patient may be gently lowered out of it.

Sixth, that phlebotomy should be done promptly on the first signs of right heart engorgement.

Seventh, that post-operative distention must be avoided.

Eighth, that morphia is the mainstay in the therapeutics.

Pregnancy predisposes to an acute exacerbation of chronic endocarditis and distinctly increases the danger of the heart lesion from pulmonary congestion, and subsequent changes in the papillary muscles. This is especially so if the endocardial inflammation is of comparatively recent date, for the establishment of proper compensation in the presence of valvular lesions takes time, as well as physical and mental rest, and this may not be possible to attain before the end of pregnancy.

The load put upon the heart is always increased during pregnancy and unless the heart is adequate, congestion of the venous system ensues; this leads to renal and hepatic disturbances, manifested clinically by œdema of the lower extremities, ascites, dyspnœa, attacks of suffocation, dry cough, palpitation, cyanosis, insomnia and albuminuria. These are progressive symptoms and become more marked as the uterine tumor grows, owing to the mechanical interference with respiration, from upward displacement of the diaphragm.

Over-distention of the uterus or pregnancy complicated with large tumors have a greater effect, besides causing vessel changes which add to the heart load; this is especially true in large fibromata of slow growth.

Labor, with its uterine action, materially increases the arterial tension. During a pain, the blood pressure is increased from 50 to 80 mm., while in the interval it is lowered. These fluctuations are a strain on the myocardium of the normal heart, more so on an embarrassed one.

Single and combined mitral disease are the most frequent valvular lesions, and in our experience mitral stenosis, with or without incompetence, is the most serious, as the myocardium is more apt to have suffered in valvular obstruction. During pregnancy the chief dangers are breaks in the compensation, and degenerative changes in the myocardium which may produce subsequent cardiac failure. The valve lesion only further embarrasses the muscular. Here, as in gynecology, *it is the muscle strength, not the valve lesion, which gives us failure or success.*

Acute lesions may develop during pregnancy or in the puerperium; these are more common during the puerperium as a complication of septic processes. Brown atrophy is found in sepsis, while fatty degeneration may follow upon severe hæmorrhages.

Everything depends on the compensation; if this is perfect, the woman under proper care may be carried through pregnancy or labor.

The writer's experience has taught him to fear heart complications in pregnancy, as the emergencies which arise are many and disquieting.

We never let a patient with heart disease, in whom the compensation has ever been broken, go to full term, as the tax of the last weeks is usually so great that the margin of reserve is used up.

We never operate during the acute exacerbation. Rest, morphine, strophanthus and digitalis, or some of its derivatives, will balance the circulation if sufficient time and care are given to its re-establishment.

In the woman with chronic discompensation with myocardial change, with liver or kidney

insufficiency, the uterus should be emptied promptly. Such cases, however, should always have a course of preparatory preoperative treatment to re-establish the cardiac balance before proceeding to interrupt the pregnancy. The earlier the uterus is evacuated, the less the cardiac strain. We advise an expectant plan in multiparæ but employ vaginal hysterotomy in the woman pregnant for the first time.

During labor, as long as nature is competent, the patient should have the closest observation, the effect of the pains on the heart should be noted, and the physical suffering of the woman partly relieved by the judicious use of morphine. Cyanosis, irregular or flagging pulse, indicate heart strain. Dyspnœa between the pains is a bad prognostic. A dry cough coming on during labor, or if the pulse drops beats, or becomes rapid, is significant of failing heart strength and demands artificial aid. The form of interference is determined by certain obstetric findings and the skill of the attendant.

First, the relation of the head to the pelvis and the position of the head in the pelvis.

Second, the amount of dilation of the maternal soft parts.

Third, the period of pregnancy.

Fourth, whether the child is alive or dead.

And finally, on the actual condition of the mother, as shown by her pulse, blood pressure, and peripheral circulation.

Operative procedures, as cervical incisions, forceps, version, pubiotomy, Cæsarean section, or craniotomy, may be done under ether-oxygen anæsthesia, where such interference is indicated and necessary, provided the engorgement of the right heart can be properly combated.

Immediately on the birth of the child the intra-abdominal pressure is rapidly lowered; these conditions predispose to right heart engorgement, while on completion of the placental stage, with the shutting out of the utero-placental circulation, a great volume of blood is thrown into the general circulation, which further embarrasses an already overloaded heart. Bleeding from the uterus, as suggested by many authorities, *does not* relieve this engorgement; it does, however, further weaken the patient. We have obtained our best results from sequestration of the blood in the extremities, and phlebotomy by opening the basilac or cephalic vein, and drawing off from eight to sixteen ounces of blood, in conjunction with the use of vigorous stimulation by camphor (oil of camphor), small doses of morphine, the inhalation of oxygen, and the application of surface heat.

When the intervention has to be made during pregnancy, the condition of the soft parts and the period of pregnancy are the determining factors.

In multiparæ, with a viable fœtus, induction of premature labor, by the introduction of the bag, and leaving the delivery to nature or shortening the second stage with forceps, is the method of choice; while on the other hand, in primiparæ, with rigid soft parts, vaginal hysterotomy offers the greatest advantages.

THE CALCIUM CONTENT OF THE BLOOD DURING PREGNANCY, LABOR, AND PUERPERIUM [1]

PRELIMINARY REPORT

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MANY of the mooted questions in medicine and surgery are to-day being investigated as to their bearing upon general body metabolism. During the last few years many investigations and observations have been reported of the disturbances of metabolism during certain diseased conditions. Complete blood, urine, and fæcal examinations are demanded in every case in clearing up intricate and obscure symptoms.

It has long been recognized that calcium salts are necessary components of the blood that it may carry out its functions in the different organs, tissues, and blood vessels. The rôle of calcium in the clotting of the blood is so well known that this function need not be further spoken of at this time. The aid that calcium salts supply to the growth of the various tissues and bones is also an accepted fact in general body metabolism. According to Blair Bell there are during the life of the individual three calcium periods in a physiological sense. First, the period of growth, when the young person or animal requires all the calcium obtainable for the formation and growth of the bony skeleton. Secondly, the period of reproduction, when a calcium equilibrium as regards growth is reached and an "excretion" of the excess occurs. This is most obvious in the reproductive processes of women, when large quantities of calcium salts are first given up to the fœtus and then for the formation of the milk during which the menstrual function is in abeyance. The third period is late in life, when no calcium salts are required for the building-up processes or for those of reproduction.

The determination of the amount of calcium in the blood in health and disease offers a probable explanation of many conditions whose etiology is still unknown. Ordinarily the amount of calcium in the blood is determined by volumetric or gravimetric methods. While either of these two methods is an accurate one under ordinary circumstances, their application in determining the amount of calcium in the blood requires a large amount of blood in order to lessen the percentage of error.

A few years ago, Mr. W. Blair Bell of the Royal Infirmary, Liverpool, devised a simple yet accurate method for the determination of the calcium content of the blood. The method requires only a small amount of blood (viz., 100 c. mm.) and is as follows: An oxalic acid solution is first made up in the strength of 1 in 30 aqueous solution. In a small capsule or vial are put 250 c. mm. of this oxalic solution (1:30). The finger of the patient is pricked and 100 c. mm. of blood drawn up into a graduated pipette and immediately emptied into the capsule containing the oxalic acid solution. The stem of the capsule is then sealed. The contents on shaking become uniformly chocolate-colored and the blood is laked. After ten minutes this mixture is ready for further dilution but if necessary the final processes may be left over for some hours, although the sooner they are carried out the better, for if left until the following day, the heavy sediment of pigment may vitiate the result.

When the examination is to be continued the neck of the capsule is broken and 250 c. mm. of the following solution added to the oxalic acid and the blood: acetic acid (one per cent) 95 parts, glycerine 5 parts. This is allowed to stand for about ten minutes, a rubber cap being placed over the neck of the capsule to prevent evaporation. The capsule is then thoroughly shaken and 100 c. mm. are withdrawn and immediately mixed in another capsule with 500 c. mm. of distilled water,

[1] Read before the American Gynecological Society, Washington, D. C., May 8, 1913.

previously placed there. It is of this last mixture that the examination is made.

A drop is placed on a clean Thoma-Zeiss hæmocytometer plate and the crystals of calcium oxalate are counted as one would count white or red blood cells and the number noted for each square; at least 250 squares should be counted.

It has been found by Bell that a standard aqueous solution of 1 in 5,000 calcium chloride, which is practically equivalent to a solution of 1 in 10,000 CaO, gives 0.59 crystals per square. Therefore an arbitrary standard has been determined that an average of one crystal per square is equivalent to a 1 in 6,000 solution of CaO.

Bell has found in a large series of determinations on ordinary individuals of middle life, that the normal, as estimated from this standard, varies from 1 to 4,000 to 1 to 5,000 of CaO in the blood.

A few important hints as to details of the technique used by Bell in his determinations are necessary in order to obtain accurate results. Tap water must of course be avoided entirely in all washings throughout all the procedures and only reliable distilled water used. Impure distilled water will upset otherwise accurate calculations. The greatest delicacy and accuracy are required in the measuring of the quantities; for, to obtain an accurate estimate, accurate dilutions are necessary.

An artificial light is much better than daylight for distinguishing the crystals and the diaphragm of the microscope must be almost closed.

For counting, a magnification of 450 diameters should be used. Only those crystals should be counted which can be definitely seen. The fine adjustment should be moved to and fro in order to get a bright speck of light followed by a dark spot.

In blood solutions the crystals are very evenly distributed, are usually of a uniform size, and do not lodge on the lines of the hæmocytometer plate; they are, until they have been on the plate for some time, continually undergoing "Brownian" movements. This is especially the case if the plate is not completely covered by the drop. They should not be counted, therefore, until they have been on the plate for a few minutes.

In albuminous solutions and especially with the use of glycerine (vide second solution above), clumping of the crystals does not occur unless the mixture be allowed to stand too long before examination.

In very strong solutions (1 in 5,000 and stronger) the crystals are sometimes uneven in size. This difficulty may be surmounted by diluting the liquid to be examined four or more times with normal saline solution before adding it to the oxalic acid. An allowance, of course, should be made in the final calculation, for the same quantity (100 c. mm.) of the diluted liquid is used as though it had not been diluted.

The above method, with the remarks on the technique, has been quoted at length from Bell, as this same method was followed by the writer in his investigations which will be reported farther on.

In summing up his work, Bell remarks that he hopes to be able by further investigations to place the normal calcium index at one. At present, if an average of one crystal per square indicates a solution of 1 in 6,000 CaO, the normal calcium index is an average of 1.5 (1 in 4,000 CaO) to 1.2 (1 in 5,000). The calculation of the CaO content easily follows according to the following formula:

$$\frac{6{,}000}{\text{Calcium index}} = \text{CaO content.}$$

The question naturally arises at this point whether the objects counted really consist of calcium oxalate in a crystaline form. In support of the fact that they are, Bell offers the following evidence:

1. When in excess many are of the definite "envelope" type, while the rest assume the recognized polymorphous (dumbbell or irregular octohedral) shapes.

2. A comparison (with a magnification of 880 diameters) of these crystals with those obtained from an aqueous solution of calcium chloride of a strength similar to that in the blood, gave an identical result as regards the appearance and number of the crystals.

3. The crystals do not stain.

4. On standing twenty-four hours, the crystals "clump," forming definite crystaline masses, which are easily recognized.

5. The crystals are insoluble in acetic acid (20 per cent); are soluble in hydrochloric acid.

6. With a small quantity of crystals obtained (from hydrometra fluid) and dissolved in hydrochloric acid, the typical flame coloration was observed, but there was not a sufficient quantity for spectrum analysis.

7. As far as can be ascertained, oxalic acid or the oxalates alone produce these crystals in the blood.

8. By adding to the blood taken, an equal quantity of calcium chloride solution equivalent to a solution of calcium oxide 1 in 5,000, a corresponding increase of similar crystals was observed.

By following the method and technique just described an attempt was made by the writer to determine the amount of calcium in the blood of pregnant, labor, and puerperal patients in the Woman's Hospital at Detroit. The blood was taken from the patient at the same time of day, diluted with the oxalic acid and acetic acid solutions and with distilled water. Extreme care was observed in measuring all solutions as well as in obtain-

TABLE I. PREGNANT CASES

No.	Age	Para	Mens.	Index	CaO.
1	17	I	VII	0.43	1:14,000
2	19	I	VII	0.35	1:17,000
3	24	I	V	0.20	1:30,000
4	20	I	VIII	0.18	1:33,000
5	18	I	VIII	0.40	1:15,000
6	19	I	VII	0.38	1:16,000
7	23	II	VIII	0.24	1:25,000
8	18	I	VIII	0.52	1:11,000
9	19	I	VII	0.45	1:13,000
10	18	I	VIII	0.50	1:12,000
11	18	I	VII	0.60	1:10,000
12	19	I	VIII	0.40	1:15,000
13	19	I	IX	0.23	1:26,000
14	23	II	VI	0.30	1:20,000
15	23	II	VIII	0.12	1:50,000
16	22	II	VIII	0.18	1:33,000
17	18	I	VIII	0.55	1:11,500
18	16	I	VIII	0.15	1:40,000
19	19	I	VII	0.28	1:21,000
20	19	I	VIII	0.10	1:60,000
21	18	I	VIII	0.88	1: 7,000
22	16	I	VIII	0.33	1:19,500
23	19	I	VIII	0.56	1:11,000
24	19	I	VII	0.19	1:31,000
25	18	I	VII	0.06	1:100,000
26	19	I	VIII	0.18	1:33,000
27	22	II	VIII	0.075	1:80,000
28	18	I	VIII	0.46	1:12,500
29	18	I	IX	0.16	1:39,000
30	20	I	IX	0.71	1:29,000
31	23	II	VII	0.24	1:25,000
32	19	I	VIII	0.23	1:26,000
33	19	I	VII	0.34	1:18,000
34	19	I	IX	0.13	1:49,000
35	36	Multi-	IX	0.08	1:75,000
36	18	I	IX	0.34	1:18,000
37	22	I	VIII	1.00	1: 6,000
38	18	I	VIII	1.20	1: 5,000
39	19	I	VIII	0.81	1: 7,500
40	20	I	IX	0.69	1: 8,500
41	22	II	VIII	0.35	1:17,000
42	19	I	IX	0.20	1:30,000
43	23	I	VIII	0.88	1: 7,000
44	22	I	VIII	0.46	1:12,500
45	19	I	VIII	0.50	1:12,000
46	28	Multi-	VII	1.00	1: 6,000
47	20	I	IX	0.58	1:10,800
48	18	I	VIII	0.14	1:45,000
49	19	I	IX	0.26	1:22,000
50	22	II	IX	0.27	1:22,000
51	19	I	IX	0.20	1:30,000
52	23	I	VIII	0.50	1:12,000
53	22	I	VIII	0.42	1:14,500
54	18	I	VIII	0.24	1:25,000
55	19	I	VI	0.89	1: 7,000
56	17	I	VIII	0.39	1:15,500
57	22	I	IX	0.16	1:39,000
58	19	I	IX	0.30	1:20,000
59	22	I	VIII	0.35	1:17,000
60	28	Multi-	VIII	0.55	1:11,500
61	18	I	IX	0.47	1:12,500
62	28	Multi-	VIII	0.24	1:25,000
63	36	Multi-	IX	0.27	1:22,000

TABLE II. DURING LABOR

No.	Age	Para	Index	CaO.	Remarks
1	18	I	0.29	1:21,000	Labor uneventful.
2	19	I	0.59	1:10,500	Labor uneventful.
3	27	Nulli-	0.22	1:27,000	During menstruation. Inserted for comparison.

TABLE III. DURING THE PUERPERIUM

No.	Age	Para	Index	CaO.
1	17	I	0.65	1: 8,500
2	20	I	0.57	1:10,900
3	..	Multi-	0.16	1:39,000
4	18	I	0.22	1:27,000
5	19	I	0.21	1:28,000
6	19	II	0.13	1:49,000
7	19	I	0.22	1:27,000
8	22	I	0.33	1:18,500
9	18	I	0.14	1:45,000
10	17	I	0.60	1:10,000
11	22	I	0.30	1:20,000
12	23	II	0.17	1:34,000
13	18	I	0.14	1:45,000
14	21	Multi-	0.08	1:78,000
15	19	I	0.60	1:10,000
16	..	..	0.18	1:33,000
17	..	I	0.065	1:85,000
18	19	I	0.055	1:90,000
19	30	Multi-	0.17	1:34,000
20	18	I	0.30	1:20,000
21	18	I	0.18	1:33,000
22	20	I	0.30	1:20,000
23	21	I	0.18	1:33,000
24	19	I	0.20	1:30,000
25	18	I	0.075	1:80,000
26	23	I	0.11	1:54,000
27	20	I	0.15	1:40,000
28	20	I	0.36	1:16,900
29	26	Multi-	0.37	1:16,000
30	19	I	0.11	1:54,000
31	18	I	0.45	1:13,000
32	23	II	0.37	1:16,000
33	22	I	0.70	1: 8,500
34	20	I	0.48	1:13,000
35	20	I	0.68	1: 9,000
36	18	I	0.27	1:22,000
37	18	I	0.22	1:27,000
38	20	I	0.38	1:16,000
39	19	I	0.50	1:12,000
40	19	I	0.68	1: 8,800
41	18	I	0.28	1:21,400
42	16	I	0.22	1:27,000
43	23	II	1.20	1: 5,000
44	..	I	0.77	1: 8,000
45	22	I	0.53	1:11,300
46	23	II	0.26	1:23,000
47	..	I	0.59	1:10,500

ing the blood. The count was made with a magnification of 530 diameters, and 400 squares were counted. The results have been tabulated as to the calcium index and the CaO content may be seen in the appended tables.

Results. The results of the observations show that there is a lessened amount of calcium in the blood of pregnant and puerperal women and of women in labor. The actual calcium index varied somewhat from 1.2 to 0.06 crystals per square. Assuming that the arbitrary standard of Blair Bell of 1.5 to 1.2 is the normal calcium index of ordinary individuals of middle life, the results tabulated show that pregnancy, labor, and the puerperium cause a withdrawal of calcium from the mother's blood. Just what the destination of the calcium is, whether taken up by the fœtus during pregnancy, by the uterus during labor, or by the breasts during lactation, must be left for later investigation. The object here is simply to determine whether there is a lessened amount of calcium in the blood during pregnancy, labor, and the puerperium. As this is simply a preliminary report, and as this work will be continued, no conclusions will be drawn at this time. But it might be interesting to state some of the possibilities that may result from a careful investigation of the calcium metabolism, not only in relation to some of the unsettled problems of obstetrics and gynecology, but of general medicine and surgery.

Drennan, in a series of articles a few years ago, discussed the phases of calcium metabolism, purely from a theoretical standpoint. The titles of her articles suggest the theories that she had, and a few will be quoted: "The abstraction of calcium salts from the mother by the fœtus, a cause of osteomalacia in the former;" "The abstraction of calcium salts from the mother's blood by the fœtus, a cause of large white kidney in the former;" "The abstraction of calcium salts from the mother's blood by the fœtus, the cause of puerperal eclampsia in the former." This work covers a period of ten years and shows that calcium metabolism was considered, although no work was done on the determination of the calcium content of the blood until Bell devised his method in 1907. Kastle, in a recent article discussed the action of calcium salts and the onset of labor. In a still later paper he reports his results with calcium salts as an anti-anaphylactic. Kastle substantiates his theories by animal experimentation. Bell, besides devising a method for calcium determination in the blood, urine and fæces, reports his work upon menstruation and its relation to calcium metabolism. He further states that calcium salts in the tissues play an important rôle in the physiology of the female generative organs.

From these considerations is it too much to hope or to prophesy that some day the unsettled etiology of the toxæmias of pregnancy may be explained by some disordered calcium economy on the part of the patient?

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PATHOLOGY THE BASIS OF GYNECOLOGY[1]

ADDRESS OF THE PRESIDENT

BY HENRY C. COE, M. D., NEW YORK CITY

A YEAR ago you conferred upon me in absentia the highest honor in our branch of the profession. The kindly message from the retiring president, that I had been chosen to succeed him, filled me at once with pride and a keen sense of responsibility. "What can the man do that cometh after the king?"

This feeling has deepened all through the year, as I have re-read the addresses of my honored predecessors, most of whom I have known — a more splendid company than those whose protraits adorn the Hall of Marshals. It is a far cry from the kingly presence of Fordyce Barker to the present incumbent, but I do not yield even to him in my earnest desire to advance the interests of the society that he loved so well.

It has been difficult for me to choose a fitting topic for a brief address. I shall try to follow the advice and example of a former president, Dr. Edward Reynolds, and remember that the modern audience expects a "twenty-minute sermon."

This has been an *annus mirabilis*. To be in sympathy with the "Weltgeist" one must sense the profound unrest which pervades the world of thought and action. "The old order changeth, yielding place to new." No slight responsibility rests with your presiding officer, both in seeking to direct the present policy of the society, and in indicating along what lines we may best work in order to keep not only abreast of the times, but in advance of them.

We are justly proud of our Transactions, presenting, as they do, a truthful record of all the real progress in gynecology and obstetrics for nearly four decades. What is the secret of our steady development? Has it been merely in the direction of improved methods of diagnosis, the perfection of surgical technique, or in the extension of our field of activity from the pelvis to the abdomen? To my mind, the reason for our present virility and promise of future usefulness is to be found in our increasing interest in pathology. I do not expect to present any novel views, and such as they are only in outline, since it is not fitting to waste your time with verbiage. The day has passed when one can expect a hearing — either in the lecture-room, or before an audience of experts — with expressions of personal opinion, or theories that "smell of the lamp," rather than of the laboratory, or post-mortem table. Even the laity now expects to be taken into our confidence, and asks what we *know*, not what we think we know.

To one who has watched the growth of this society only during the past ten years, the most striking evidence of progress has been the respectful attention paid to the papers of our younger Fellows, who are known to be thorough students of pathology, as well as bold and original surgeons. The new blood that has been infused into our circulation has had a wonderful effect.

The history of the development of pelvic pathology among us is like the history of nations — constant strife, the destruction of outworn theories, handed down from one generation to another, ending in the survival of the fittest. The modern historian no longer accepts without question the statements of his predecessors, no matter how high their reputation for veracity, but consults the original documents, sifting the true from the false or doubtful.

Every crystalized belief is preceded by negation. Pragmatism is our working philosophy; we demand facts, not theories. It would be interesting to trace the process of evolution through which we have escaped from the bondage of old ideas and attained our present knowledge of pelvic disease, but this is sufficiently familiar to you. In his brilliant presidential address, delivered seven-

[1] Read before the American Gynecological Society, Washington, D. C., May 7, 1913.

teen years ago, Dr. Polk presented a thorough résumé up to that time, and the reader followed the same course in an address before the Canadian Medical Association in June, 1910. Even in the two years that have elapsed notable additions to our knowledge have been made, as will be evident on turning the pages of the recent volumes of our Transactions.

So much light has been thrown upon familiar subjects, through the aid of bacteriology and experimental pathology, that it seems almost as if each new edition of a textbook must be entirely rewritten. Let us contrast our past with our present attitude towards a few of these old questions. The bewildering array of separate "diseases" of the pelvic organs in the earlier books has been practically eliminated. Recognizing the fact that few morbid conditions, except congenital, exist independently, but that they are simply links in a pathological chain, we no longer mend a single one, but by combined operations aim to reverse the process following puerperal lesions, for example, and so to restore all the organs to a state as near the normal as possible.

Uterine pathology — the bugbear of our student days — has been simplified. The expression "chronic inflammation" is regarded with disfavor, as an unscientific term for connective-tissue hyperplasia, which is really an "end-process." The importance of laceration and erosion as the site of cancer of the portio, and the necessary inference that amputation is the only logical treatment, has long been firmly established by the microscope. At this time, when our minds are focused on the radical operation, let us not forget in how many thousands of cases the development of malignant disease has unquestionably been prevented by this simple procedure. Dr. Emmet himself recently stated to me that the knowledge of this fact afforded him greater satisfaction than all his other contributions to gynecology.

Time would fail us to review the conflicts that have been waged around those wonderful ductless glands, of which we were once so profoundly ignorant; indeed we have just begun to know a little about their physiology and pathology. It was not so long ago that the fate of an ovary (or both) was decided at the operating-table by the macroscopic diagnoses, "cystic degeneration," "cirrhosis," "hypertrophy," etc. Even the laudable desire to atone for our past errors by conservation of apparently healthy tissue has proved our limited knowledge, as shown by the occurrence of degenerative changes, requiring a second operation. One fact we all admit — the necessity of preserving ovarian tissue in young women, not so much for the purpose of favoring conception as of preventing the serious climacteric disturbances so common in the early days of indiscriminate oöphorectomy. I need not dwell upon a subject that has been so often threshed out here, though it will be long before the final word is spoken. We have learned that pathology has nothing in common with empirical surgery, or "symptomatic" cure.

Our knowledge of tubal disease has made rapid strides with the aid of bacteriology. How often we admire the prophetic vision of Noeggerath, who groped his way where we now see clearly! The ultimate results of tubal infection — ectopic gestation and sterility — once so difficult, are now elementary. The etiology and treatment of pelvic suppuration, so familiar to every medical student, were long obscured by the famous pair, pelvic "cellulitis" and "peritonitis." But, however crude may have been the old pathology, let us not forget that the treatment was sound — to incise and drain a pelvic abscess per vaginam. When, with increasing boldness, we began to open the abdomen in acute inflammatory affections, we paid for our experience at a fearful cost. Even the general practice of drainage did not avail; in fact, we now know that probably the majority of the patients who recovered did so in spite of it. Bacteriology, in its practical application to aseptic technique and the differentiation of sterile and infected pus, taught us that (contrary to Scripture) "the things that go in (not come out) defile."

Intrapelvic adhesions — their etiology and resulting complications — have always been of peculiar interest to the gynecologist, clinically as well as surgically. While we

have succeeded in eliminating them to some extent as post-operative sequelæ, their prevention (even in clean cases) has not yet been effected, though experimental pathology offers hope. How do exudates disappear, and is the process hastened by treatment? We can not affirm that a satisfactory answer has yet been given.

We have not been content to accept the old mechanical theory of sterility, for we have learned that it is often due to closure of the distal ends of the tubes, the result of former inflammation of so mild a grade as to be unattended by symptoms. That we may systematically open the abdomen to look for this condition, in the absence of other causes, is within the range of probability. The rôle of micro-organisms in the etiology of pelvic infections has been so thoroughly studied that it would seem as if little could be added. But, there still remain unsolved problems, perhaps in the direction of lymphatic extension. The question of colon-bacillus infection illustrates in a striking way the inter-dependence of pelvic, renal, and intestinal pathology.

The study of neoplasms has been enriched by the work of our own brilliant Fellows, Drs. Cullen and Sampson. Who would have imagined a few years ago that the prosaic fibromyoma offered such an opportunity for original research, or that the study of the development and extension of carcinoma uteri was still in its early stage. The important subject of the degeneration of benign neoplasms (especially of the ovary) in its bearing on early operation need only be mentioned.

As regards the urinary tract, one has only to compare the frequency of cystitis as a post-operative and puerperal complication, with its rare appearance now, to appreciate the value of asepsis as applied to this delicate organ. The immense aid afforded by modern endoscopy and ureteral exploration needs no comment.

The importance of the pelvic floor, originally pointed out by Dr. Emmet, has been verified by careful dissections. The mechanism of prolapse of the vaginal walls and adjacent viscera (true herniæ) has been clearly demonstrated, and with it the fallacy of our former crude operations. Restoration of torn fasciæ and muscles, rather than simple contraction of the canal or suspension of the uterus, has been recognized as more in accord with nature's methods. Fixation of organs, normally mobile, has been rejected as substituting one morbid condition for another.

As we have invaded the general abdominal cavity surgically, so we have made important contributions to its pathology, not the least being the study of ptoses, especially in relation to pelvic disorders, of appendicitis as a complication of inflammation of the adnexa, of pyelitis, intestinal toxæmia, etc. As shown by our present program, we have been deeply interested in the blood and in circulatory disturbances, even more than the general surgeon. Who would have prophesied ten years ago that the pelvic pathologist would have extended his observations to such distant fields?

We have joined hands with the neurologist and alienist and traversed their own paths. Psycho-neuroses, which they have surrounded with a new and formidable nomenclature, we have not hesitated to view in the light of our peculiar knowledge of women, and we have gone far in lifting the veil of mystery once thrown around symptoms vaguely denominated "reflex." No more striking evidence could be adduced to show that the modern gynecologist must be familiar with every department of medicine and surgery, in order to formulate precise rules for diagnosis, prognosis, and treatment in his own branch. In this respect our specialty is unique.

Much has been said about the rivalry between the general and gynecic surgeons. From a purely surgical standpoint this may be true, but in what may be called the "higher education" of the gynecologist, his deeper insight into the etiology and treatment of abdominal (as well as pelvic) disease, there is a wide divergence in our purposes and accomplishments. To my mind, the future gynecologist will aim at something more than the mere perfection of surgical technique and ability to deal with every viscus in the body. He will feel it as a reproach that he is content to apply surgical treatment for the relief of

familiar symptoms, for which he has as yet established no satisfactory pathological explanation.

The most familiar symptoms of the consulting-room — pain and uterine hæmorrhage — await a more scientific solution than has yet been presented. After we had escaped from the thralldom of the hypodermic syringe, we began to realize that pain is more or less relative. Could there be any greater contrast than the opium treatment of peritonitis and the infrequent resort to opiates after laparotomy? Formerly, we began by masking the pain, and so failed to discover its cause, or to estimate its severity. Many patients with ruptured appendices and ectopics died painlessly, without operation. Now we seek to establish the diagnosis first and to relieve the pain afterward. When no obvious cause could be found, with the imperfect methods once in vogue, it was referred to "hysteria," and women with grave abdominal lesions were treated as neurotics. The term "functional" is now regarded as often a cloak for ignorance.

The necessary association of pain, of a so-called "lancinating" character, with internal malignant disease is an idea so firmly established that it is difficult to eradicate it from the minds of the general profession, as well as of the laity. How many women with cancer have been allowed to reach the inoperable stage because of the absence of this symptom we dare not conceive.

We are still in the dark as regards the etiology of various pelvic pains, when an opportunity is not afforded by explorative section to verify our doubtful diagnosis of localized adhesions, twists of pedicles, minor degrees of cystic and cirrhotic changes in the ovary, etc. Dysmenorrhœa is a term which we use glibly enough, but often with a frank acknowledgment of our inability to explain it. In the absence of palpable morbid conditions, we speak vaguely of "deficient innervation," "irregular uterine contractions," "psycho-neuroses," etc. We turn to the neurologist for aid, but his explanation is sometimes more difficult to understand than the symptom itself.

Uterine hæmorrhage (especially metrorrhagia) has assumed more importance than ever, in view of the fresh interest awakened in the early diagnosis of malignant disease. Personally, I have felt that if I could teach my students to properly estimate its significance, to seek intelligently for its cause in every case, and to recognize the indications for surgical treatment, other subjects might be passed over as secondary. That this symptom is often lightly regarded by the general practitioner, who usually adopts the ordinary routine drug treatment, is a matter of daily experience. The advice to explore the uterine cavity with the curette, and to have the tissue examined by a competent pathologist is just beginning to be heeded by the younger generation of medical men. But, after we have exhausted the ordinary list of etiological factors, there is still a considerable number of cases of metrorrhagia (especially in healthy girls) for which we can find absolutely no explanation, with all our increasing knowledge of uterine and ovarian physiology and pathology. Even in those extreme cases in which, after repeated curetting with negative results, the uterus is extirpated, the careful study of serial sections has not thrown much light on the phenomenon. The theory of defective innervation is unsatisfactory. Doubtless the solution may be found in certain obscure vascular changes, as yet unnoticed, or misinterpreted.

This hasty glance at a few of the steps by which gynecology has advanced hand in hand with the study of pathology will prepare us to ask how, by its aid, we may best deal with the present and future problems which confront us.

We hear it stated so often that gynecology is an outworn specialty, soon to be merged in general surgery; or at any rate, that it has become crystalized. So far from this being true, the thoughtful observer will admit that we are really on the threshold of new achievements. We are not bound by narrow surgical limitations, but take a broader view of the functions of the gynecologist. The tendency to regard every affection from an operative standpoint and to encroach on the field of the internist is not habitual with us, who are swinging over to the opposite opinion, that there is a distinct field for so-

called "medical" gynecology. This is shown by the respectful attention which we have bestowed upon organo-therapy. Having under constant observation the two most important ductless glands in the body, we can not view with indifference the work of experimental pathologists and therapeutists. Whether we accept or reject the theory of "internal secretion of the ovaries," we agree in assigning to them an important influence upon metabolism quite independent of their ordinary functions. This was recognized by the early ovariotomists, and we have only confirmed their observations, especially in regard to the artificial climacteric.

The disorders of the menopause are still a reproach to us, as we seem to have made but little advance in relieving them. We are equally unsuccessful in those obscure cases of amenorrhœa in young women, associated with premature atrophy, or non-development, of the uterus or ovaries. If (as seems to be substantiated by competent observers) the administration of glandular extracts offers even temporary relief, especially of the distressing "hot flushes," we should give them not a perfunctory, but a careful and intelligent trial. Extended observations, both clinical and experimental, and collective investigation by the whole body of specialists are necessary before positive deduction can be made. This is a fascinating subject, but we may not dwell upon it.

The burning question of the day to us — and through us to the world at large — is undoubtedly cancer of the uterus. We are on the eve of a new propaganda which will undoubtedly be productive of great good, the details of which you will hear from the readers who are to discuss this subject. This society will render a signal service to humanity in initiating popular education, whatever we may decide are the best channels through which to diffuse information. The point to be impressed upon the laity is that the earlier the diagnosis, the more radical the operation, the better is the prospect of permanent relief. This is the position always taken in the frequent discussions before this society, though opinions have differed as to the best method of treatment. Naturally, with improved methods and surgical experience, we have gravitated towards the abdominal route, especially under the influence of the German school.

Following along the line of pathology, we may ask how far we have advanced in the early recognition of carcinoma uteri by the aid of the microscope, and whether the general profession after generations of teaching has learned how to make an early diagnosis. Judging by the small percentage of operable cases in this country, we are compelled to give a negative reply. The history of every inoperable one is practically identical — an astonishing neglect of initial symptoms on the part of the patient, and a corresponding neglect of her physician to confirm his suspicions (if he had any) until too late. How can we blame the busy practitioner for not removing doubtful tissue from the cervix, or uterine cavity, and submitting it to an expert, when the study of pathology is at such a low ebb in many of our large hospitals and valuable specimens are lost through the carelessness of internes, who are more interested in surgery than in morbid anatomy? It is certain that many an amputated cervix, when carefully examined, shows evidence of commencing cell-proliferation, and that the diagnosis "glandular hyperplasia," is too often made from a macroscopic examination of the specimen, when it is really incipient adeno-carcinoma. On the other hand, the pathologist may give a favorable prognosis, because he has not changed to hit upon sections showing malignant degeneration, when all the other evidence leads one to urge a radical operation. Doubtless not a few uteri have been removed which were not cancerous, especially in the early days. Great care should be exercised not to include these among genuine cases, as they seriously affect the value of statistics.

More intelligent study of the parametria has shown that many cases were rejected as unfavorable when the disease was really confined to the uterus, inflammatory exudate being mistaken for cancerous nodules. The limits of the radical operation have been greatly extended by Wertheim, whose experience and technical skill enable him to

deal with cases formerly regarded as inoperable.

The question of glandular metastasis is all-important and is still *sub judice*. As you are aware, a considerable percentage of the lymph-nodes removed have been found to be healthy. Their extirpation is one of the most difficult steps of the operation and the uncertainty with regard to their involvement is a weak point in a brilliant surgical accomplishment. The anatomical conditions are so different from those in the case of the breast that we can never expect that the dissection will be as thorough and certain. The question of recurrence is one in which more extended observations are necessary, before we can affirm positively how far the element of the infection of raw surfaces with cancer-cells affects the prognosis. It is by no means clear why late recurrence occurs, as it so often does, in the cicatrix rather than in the lymph-nodes.

A word as to Wertheim's operation: We have taken it up anew with all the boldness and enthusiasm which have always characterized our abdominal surgery. I would not say a word in disparagement of the work so successfully accomplished, but only venture to suggest that we proceed more cautiously and temperately than we have done in the case of other popular operations learned from foreign surgeons. Let us not forget that many innovations have come and gone —intra-uterine galvanization, vaginal hysterectomy for diseased adnexa, nephropexy, and others equally promising. In fact, our Transactions are the burial-place of many methods of treatment, which promised to be permanent, but were tested and found wanting. May it not be the case with the radical operation for cancer of the uterus, which holds out such promise for the future. To avoid this, to win for American gynecology recognition abroad, we must not only educate the profession and laity in the direction of early diagnosis, but must exercise greater care in the selection of our cases and not impair our statistics by "taking chances" with doubtful ones, at least until we have attained sufficient skill and experience to extend the limits of the operation, as suggested by our German teacher. Technical difficulties do not disturb us, and the temptation to complete the operation after the abdomen is opened is often too strong for the most conservative surgeon. The immediate risks (shock, hæmorrhage, infection, injury to viscera) and the subsequent complications must always be borne in mind. But, as in every other capital operation, it is all a question of experience and judgment, as well as of perfect technique. Let us never forget that what we aim at is *cure*, not simply recovery from the operation and temporary relief. It is the occasional operator who reflects discredit upon the whole. Desperate as her condition is, the patient can not be the subject of a doubtful experiment. It has always seemed to me that the conscientious surgeon, whose experience is limited, will hesitate to attempt a formidable operation which he can not do *well*.

Many heroic surgical experiments have been tried for the relief of inoperable carcinoma of the uterus which have no pathological basis, and do not commend themselves to us, who are endeavoring to establish the proper limits of a legitimate operation. In this connection we must not forget the work of Byrne, founded on sound anatomical principles and worthy of immortality, instead of being buried in our records.

We can not be indifferent to the earnest efforts of pathologists to discover the ultimate cause of cancer, and by careful experimentation to find a cure, either a serum, or some metallic compound analogous to salvarsan. It can not be possible that the efforts of the many devoted workers in the laboratory will not eventually be crowned with success. While we pin our faith at present to surgery, so far from any antagonism existing between the laboratory and the operating-room, they are essentially interdependent. We may safely trust the pathologist to discourage the countless "cancer cures," daily vaunted in the press, by which so many sufferers (who might have been relieved by an early operation) are deluded. It would seem as if the pelvic pathologist, were in a position to render valuable aid along this line, for in no region of the body

are the conditions more favorable for noting the very inception of cancer and studying the course of its invasion of adjacent tissues and metastases, the late occurrence of the latter being characteristic of uterine disease. It would be a great triumph for us to lead the way not only in the surgery, but in the pathology, of malignant disease.

The weak point in our work so far has been our statistics. They must be more accurate and more extensive before we shall be justified in drawing any positive deductions. A permanent committee should be appointed, vested with the power of collecting the statistics of this society and making a report at each annual meeting. An accurate record of the condition found at operation, the time and site of recurrence, the health of the patient at the time of the report — these could easily be ascertained by a system of blanks issued at regular intervals.

The air is full of new theories on education, so that we are fairly bewildered by them. The original purpose seems to be lost sight of — the training of the mind and power of concentration, the practical application of facts to the business of daily life, as well as the formation of that mental attitude which we call culture.

Our medical education is in a stage of transition, greatly improved by comparison with the former days, but still with much to be desired. We may feel fairly satisfied with the present methods of instruction in gynecology and obstetrics. In the substitution of recitations and demonstrations for didactic lectures, personal instruction in small classes instead of public operations in the amphitheatre, and practical work in hospitals, a great advance has been made towards evolving a more scientific type of physician.

It is true that the student becomes familiar with the ordinary histological and bacteriological examinations, but no opportunity is afforded for the careful study of pathological specimens, as in the English schools. He can tell how a specimen ought to look, but he would not be so apt to recognize it when he sees it. We can not hope that he will learn to think for himself until he sees the true relation between symptoms and their anatomical cause. Certainly the indications for an operation will be uncertain unless he recognizes the existing pathological condition and the morbid processes of which it is the result.

The past year has been marked by social and moral unrest, of which woman is the natural exponent. The late Dr. Skene concluded his presidential address on the "New Woman" with the witty statement that "after all, she was the same old girl." I wonder what he would have said of the modern type? According to the shallow pessimism of the press (and even of the pulpit) she is already in an advanced stage of degeneration. *We* know better, in spite of the freakish dress and manners of young girls, the lowered moral tone of so-called society, the modern attitude toward marriage, its duties and obligations, the prevention of conception, abortion, fear of maternity, frequency of divorce, and all the other evils, of the existence of which none are so conversant as ourselves. But, in better hygiene, athletics, higher education, general interest of the sex in practical questions about which they were formerly indifferent, we read the signs of distinct progress. Eugenics is an old theory with us, for we have always advocated it, usually to deaf ears. Suffrage is only one phase of the larger question — equality of the sexes. In a recent remarkable book by Olive Schreiner, on "Woman and Labor," the writer makes a strong plea in favor of admitting women to all the employments of men, claiming that she can no longer be regarded as simply a parasite, a sort of higher animal, whose only function is to bear and nurse and rear. However we may differ from her, knowing that this attitude does not take into consideration sufficiently the physical factor, we must acquiesce in her conclusion that marriage is a comradeship, not merely a sexual relation, that "the New Woman is waiting for the New Man."

Dr. Cleveland referred in his address, six years ago, to popular education in social and moral prophylaxis, then in its infancy. We have gone far since then and men and women work shoulder to shoulder in instructing the young in sexual matters, in preaching the single standard of morality and in trying to

stem the tide of social evil. People have learned to call ugly facts by their right names and to put the responsibility for sin and suffering squarely where it belongs — upon the male offender. We, of all others, must help along this work, for it is the most sacred of all our varied responsibilities. The time seems to be approaching when the old Spartan idea may be revived and the state will concern itself directly with the future race.

"What do you raise in this God-forsaken country?" asked a tourist of a grim old Scotchman. "We raise *men*," he replied. I take it that this includes the whole matter of eugenics.

The Council has given earnest consideration to the question of how our work can be improved, the prevailing opinion (as reflected in the present program) being in favor of symposia, rather than in a superfluity of scattered papers. It has also seemed profitable to ask gentlemen interested in other departments to unite with us in the discussions, and we hope that this new departure will prove profitable. In order to give our Transactions more weight abroad we should aim at shorter papers, based on more extended statistics. There are too many societies and too many meetings in the United States. Why do we spread ourselves over so much space? Why not save our *best* work for this meeting, or if we do discuss the same subjects elsewhere, let us present them here in a more scientific and less elementary form than at local societies. If we are to keep in the front rank, we must aim at something more than mere reports of cases, or improvements in surgical technique. Our discussions have always been lively and interesting, as expressions of the individuality of independent thinkers. This is a busy age and few readers have the patience to wade through pages of personal reminiscences. It is the terse, forcible speaker and writer who commands attention. We have never suffered from monotony and have had some good square fights on this floor, always good-natured. I hope that the time will never come when we shall all agree about everything.

This is no place for local pride or personal aggrandizement. "One for all and all for one" should be our motto. "Team-play" is as essential in a scientific body as on the football field. Let us cultivate the spirit of the true soldier — self-effacement. Perish our names, our little deeds, our transient reputation, but live the Society, which has always stood for the highest and best in gynecology and obstetrics. In the wars of the future the unit (enlisted man or regiment) may be deliberately sacrificed for the good of the whole army by the chief, who sits at his "Kriegspiel" miles away from the scene of conflict. We are private soldiers, whose only aim is service. This was the spirit of our founders and we can have no higher ideal than that of those great souls, "whose works do follow them."

Let us constitute ourselves a "committee of the whole" to investigate every new and living question and so arrive at conclusions worthy of consideration. I would have fellowship in this society regarded as the highest honor to which a rising man can attain. No local prejudices should influence our selection. We know neither North nor South, nor East nor West, but one faith and one high endeavor.

A marked feature in nearly every presidential address has been not only the expression of pride in our past achievements, but a prophetic tone. Many of the predictions have been fulfilled. Those who are spared to celebrate our fiftieth anniversary will doubtless be so accustomed to the marvels of science that they will read with an indulgent pity the records of our boasted progress.

Is it an empty dream to predict the perfect triumph of preventive medicine — the cure of cancer, the total elimination of infection, the prevention of puerperal lesions, or such immediate repair as to forestall future operations? There need be no fear that our brilliant achievements in surgery will not be left far behind, though we shall no longer attempt heroic operations in desperate cases, but, through our more intimate knowledge of pathology, we shall operate earlier and with a certainty of permanent results.

The ultra-enthusiasm of the past will give place to calm and logical deductions based upon exact knowledge, and we shall no more

be "carried about with every wind of doctrine." There is no fear that gynecology will remain stationary, as shallow critics affirm, for our best work is still to come. It is inspiring that this work will go on, "ohne Hast, aber ohne Rast," after our little increment has been added to the whole.

I know no more pathetic words than those which conclude the antobiography of that mighty thinker, Herbert Spencer, who, reviewing a long life, in which he had sacrificed everything to pure science, asked himself: "What if there exist no comprehension anywhere?" No such despairing thought is ours as we review the past and look forward confidently to the future. We *know* that we have not labored in vain.

This year our inner circle has not been invaded by death. Thank God for this and for our mutual respect and friendship, unchanged and unchanging.

I had hardly written these words of congratulation when I received the news of the death of one of our youngest and most promising Fellows, Dr. Edgar Garceau, of Boston, under circumstances so pitiful that it wrings the heart. We can ill afford to lose such a man, but we can only rejoice that suffering, so bravely endured, is at an end.

We have lost two distinguished Honorary Fellows, the genial and brilliant Frenchman, Dr. Paul Ségond, and recently that "great child of honor," Dr. John S. Billings. As we older men realize that we have reached that stage of the journey so beautifully described by the poet,

"When the milestones turn to headstones,
And beneath each one a friend,"

we recall the shining ones who met with us in the years long vanished. But no note of sadness mingles with the retrospect, no murmur against the universal law of Nature, that we must give place to younger and fresher men. We know that our places will be worthily filled, that "more stately mansions" will be builded than those which we have ever known, when we too

"Leave our outgrown shell by life's unresting sea."

THE MANAGEMENT OF PUERPERAL THROMBOPHLEBITIS[1]

By PALMER FINDLEY, M. D., Omaha, Nebraska

PUERPERAL thrombophlebitis has been and still is the despair of the obstetrician. As we study the reports of maternity clinics and recall our own experiences we find very little encouragement in the management of this type of puerperal infection. It is true of the past that the profession has done nothing to stay the progress of the infection further than to fortify the individual by regulating the diet and providing an abundance of fresh air, and it is equally true that meddlesome interference on the part of the attending physician has done much to increase the mortality of this disease. Our one great achievement in the management of puerperal sepsis has been in the way of prophylaxis.

The suggestion of Sippel, Bumm and Trendelenburg, that the thrombosed veins should be ligated above the advancing clot, has inspired a few of the profession in a zealous effort to lower the mortality of the disease, but as yet the champions of the Trendelenburg operation are few in number as compared with the skeptics. At first the suggestion appealed to me as being correct in theory, and while I refrained from putting it into practice I watched with interest the work of Fromme, Cuff, Latzke, Lenhartz, Miller, Opitz, Vineberg, Williams, Noble, Huggins and Freund. In all I have noted 114 case reports, and as I compared these reports of cases with my own observations the little faith which I had imposed in the operation of Trendelenburg gave way to a feeling of skepticism.

In the past eighteen months I have had ten

[1]Read before the American Gynecological Society, Washington, D. C., May 8, 1913.

of these cases under observation. Following is a brief analysis of these cases from the viewpoint of surgical intervention.[1]

CASE 1. Mrs. N. was delivered of a dead fœtus of four months' development. Two chills, with high fever, preceded the delivery and there were evidences of lung invasion four days after the delivery. She came under my service two weeks after the initial chill and died two weeks later. The post-mortem examination revealed thrombosis of the right spermatic veins throughout their entire course and of the right uterine veins. There were no thrombosed veins on the left side. Multiple abscesses were found in the right lung and the right pleural cavity was filled with pus. In the light of the post-mortem findings there was a time when a ligature placed above the advancing clot in the spermatic veins and another about the internal iliac vein, would have stayed the progress of the disease. All this seems very plausible, but it is questionable if operative interference would have been justified at any time in the course of the disease because of its rapid development. How could one have been assured that bacterial emboli had not already invaded the general circulation and found lodgment in the lung, no matter how early the veins may have been ligated? Furthermore, had the patient lived long enough, have we any assurance that the infection would not have traveled by other avenues?

CASE 2. This is the first and only case I have operated. The patient had given birth to a full term child three weeks before my first examination. She had had twelve severe chills, her temperature ranged from subnormal to 105° F., the physical findings in the pelvis, abdomen and lungs were negative. She was evidently losing ground and in the hope of doing something worth while I opened the abdomen, explored the pelvic cavity and found no evidences of thrombosis. However, I ligated both spermatic veins. Within a week the right lung was invaded and for two months the patient struggled with a violent general infection. Large quantities of pus were removed from the pleural cavity from time to time. Eventually she recovered. So far as I am able to say there was metastatic invasion of the lung in the absence of pelvic thrombosis.

CASE 3. This was a post-abortive infection. I first saw her three weeks after the abortion, when I drained pus from the cul-de-sac. Two weeks later the left lung was invaded by infected emboli and in a few days the right lung was invaded. She died two weeks after the miscarriage. At the autopsy it was revealed that the infection had progressed along three distinct avenues. First, the infection advanced by continuity of tissues from the uterus through the tubes to the pelvic peritoneal cavity; there was a general plastic exudate over the pelvic peritoneum and a large accumulation of pus in the cul-de-sac which had been effectually drained. Second, there was a general lymphatic invasion throughout the abdomen. Third, there was an extensive involvement of the pelvic veins. On the right side the hypogastrics, spermatics, internal, external and common iliac veins contained thrombi which were largely purulent. On the left side the hypogastrics and internal iliac veins were thrombosed. Both lungs contained numerous metastatic abscesses and in the blood was a short chain streptococcus. In this case I am of the opinion that an abdominal section would have been hazardous in the presence of the pus accumulated in the free peritoneal cavity, and it is questionable if the general lymphatic invasion would not have led to a fatal issue had the infection in the veins been checked by ligatures.

CASE 4. This case was seen in a country house. Three months before my visit she had given birth to a full term child and in the second week of the puerperium she had a severe chill, followed by a temperature of 104° F. There were no subsequent chills but throughout the following ten weeks she had an afternoon rise of temperature of from 101° to 102° F. The physical findings were negative and I assumed from the clinical history that she had a vein infection. She responded promptly to stock vaccines. Incidentally I may say that this is the only case of puerperal infection, in my experience, which has responded to vaccine therapy.

CASE 5. Here was an opportunity, at some time in the course of the disease, to forestall the infection. The patient had been delivered of a full term child three weeks before her death. I saw her in the second week of the puerperium when she manifested great depression. Her temperature ranged from subnormal to 105° F. and the pulse from 110 to 150. There were no evidences of metastasis; the abdominal findings were negative. In the right broad ligament I could feel an indefinite thickening. I did not seriously consider operative interference because of her great depression.

On post-mortem examination the right spermatic veins were alone involved. Dr. Dunn of Omaha performed the autopsy and in the examination he made the statement that the vein was thrombosed no further than the brim of the pelvis. However, upon splitting the vein a mural thrombus was found to extend fully two inches above the point where the thrombus was palpated before the vein was opened, and the upper segment of the vein was filled with pus. Had I operated this case I am convinced that the vein would have been ligated far below the infected thrombus.

CASES 6 and 7 were seen in country homes; one recovered, the other died. The one that died was given vaccines, the one that recovered was given no vaccines. In both cases we depended solely upon fresh air and nourishing food.

CASES 8 and 9 were too far advanced when admitted to the hospital to consider surgical intervention. There were metastatic abscesses in the lungs of both cases. On post-mortem examination the

[1] A detailed report of seven of these cases appears in the Am. J. Obst., N. Y., 1912. No.6.

right spermatic veins in the one and the left spermatic veins in the other were alone involved.

At the time of writing I have under my care the tenth case of the series. She is now in the fourteenth week of the puerperium; has had but one chill, and that ten days after delivery. Her temperature ranged daily from subnormal to 102° F. and the pulse from 100 to 140. As yet there are no evidences of metastasis, but on the left of the uterus the broad ligament is somewhat thickened. The staphylococcus pyogenes albus was found in the blood. This patient will soon be returned to her home in the country where she will be better supplied with nourishing food and fresh air. I cannot bring myself to a decision to operate her.

Letters of inquiry were sent to a number of the obstretricians and a few of the general surgeons of this country for the purpose of ascertaining the consensus of opinion in respect to the Trendelenburg operation. Of those who replied, eight were non-committal in their attitude toward the operation though in nearly all of these letters there was an implied doubt as to the feasibility of the operation. Five others had no personal experience with the operation but thought favorably of it. Five wrote of the cases they had operated and were in favor of operating in carefully selected cases. Fourteen expressed decided objections to the operation.

Williams writes that he has had no cases since the publication of his paper in 1909, but is encouraged to continue his operative work on these cases as the occasion arises. Huggins believes that "some cases can undoubtedly be saved by operation that would die if treated conservatively." The work of Vineberg is well known and his views have not changed since the reading of his paper before this society two years ago. Lobenstein has operated two cases successfully and feels encouraged to continue in the work. George H. Noble finds that, with added experience, he is better able to select his cases for operation. He is getting good results from serums and bacterins, but still believes in ligating the veins in carefully selected cases. Ernst Jonas believes the operation is a legitimate one and, having witnessed some of this work in the hands of Bumm, he is inclined to favor it. Jeff Miller of New Orleans, as we know, is a devotee of the operation. Charles Paddock writes that he has recently operated a case successfully.

On the other side of the question is Sampson, who says the operation does not appeal to him for the reason that inaccessible veins are frequently involved. He believes in letting the pelvis severely alone, with the exception of drainage for pelvic abscesses. Newell has never seen a case of puerperal thrombophlebitis where it did not seem to him that operation was likely to take away the patient's chance for recovery, rather than help the patient. E. P. Davis looks upon thrombosis of the pelvic veins as a conservative process which had better not be interfered with. Bandler believes we are powerless to stop rapidly advancing thrombosis and in the localized types which are not acutely virulent the body resistance can be fairly depended upon to master the situation. Webster has never been attracted to the procedure. He fears the dissemination of the infection in the manipulation of the tissues and refers to the likelihood of the infection traveling by other avenues subsequent to ligation. It is his opinion that the mortality will be increased by operative interference. The results of Brettauer have been absolutely negative; he finds great difficulty in making an early enough diagnosis. Gellhorn avows his faith in the out-of-door treatment and finds no place for the Trendelenburg operation. Hirst finds the mortality following the operation to be extremely high and does not find occasion for the Trendelenburg operation in the many cases of puerperal infection which he operates. Ehrenfest has never been able to satisfy himself as to the indications for the operation and does not regret his failure to operate this class of cases. De Lee has seen no case where he felt that the operation could have altered the clinical course of the disease. Swartz is of the opinion that the operation should be abolished, because the few cases which turn into general pyæmia cannot be quoted as a legitimate excuse for sacrificing a certain considerable percentage of the large majority of cases which recover without operation. From the viewpoint of the general surgeon, we find that the operation does not appeal to John B. Deaver while J. B.

Murphy says that the direct treatment of the vein lesion appeals to him as a general surgical proposition. Taussig is of the opinion that an accurate diagnosis of the case and when to operate is impossible, and feels that in the long run more cases would be harmed than benefited by such operative procedures.

With this review of my recent personal experiences with puerperal thrombophlebitis, together with the expressions of opinions of many of our workers in the field of obstetrics, I submit the following propositions for your consideration:

1. The Trendelenburg operation is surgically correct in theory, but as a practical proposition it is a questionable procedure.

2. The difficulties involved in the making of an accurate diagnosis before opening the abdomen are, as yet, insurmountable; furthermore, it is not possible to judge with accuracy the extent of the infection within the veins or elsewhere after the abdomen is opened. We cannot rely upon the sense of touch to locate with certainty the limits of a thrombus, nor can we judge with certainty the presence or absence of pus within the veins. Failure to find bacteria in the general circulation gives no absolute assurance of the localized character of the infection, nor can a physical examination of the lungs and other viscera exclude the possible presence of metastatic foci.

3. It is in direct violence to our rules of practice to traumatize tissues in the immediate neighborhood of a virulent infection. In reviewing the reports of cases I have been seriously impressed with the boldness with which some operators violate this time honored principle of surgery. If the infected veins are not dissected out have we not locked the thief in the stable when we do no more than ligate above the zone of the infection, and if we do dissect out the infected veins do we not incur serious hazards in the way of disseminating the infection? Furthermore, the risk of dislodging a thrombus in exploring the pelvic veins must be reckoned with.

4. It is a physical impossibility to ligate all the veins leading from the genital organs and unless all channels are blocked there can be no assurance of checkmating the infection. Among the ardent supporters of the operation are those who would ligate the lower end of the vena cava and both spermatic veins, claiming that the collateral circulation can be depended upon to re-establish the return circulation. Is this not an argument in favor of the contention that the venous channels leading from the infected uterus cannot be controlled by ligatures?

5. The physical resistance of all cases of puerperal infection is far below par, a fact which should make us cautious in adding further to their burdens. We may well rob them of the little resistance they possess.

6. Little dependence can be placed upon serums and vaccines in these cases.

7. Whatever may be our views on the question of ligation of veins or upon the administration of serums and vaccines, we are all agreed that the body resistance must be supported by fresh air and nourishing food.

UNDER WHAT CONDITIONS SHOULD UTERINE INERTIA BE TREATED BY ARTIFICIAL DELIVERY?[1]

By EDWIN B. CRAGIN, M. D., New York City

UTERINE inertia is often a source of danger both to mother and child. To the mother from the predisposition to hæmorrhage and infection, with all their associated complications; to the child from interference with its placental circulation and from prolonged cerebral pressure.

That an overtired uterus is apt to bleed after delivery and that a woman who has had an intra-partum or post-partum hæmorrhage is apt to have a rise of temperature during her puerperium are facts well known to most obstetricians.

It is also a fact which deserves recognition that a too prolonged uterine inertia gives rise to an increased mortality and morbidity of the child, the latter of which may not be evident until, later in childhood, an impaired mentality shows the result of a cerebral hæmorrhage at birth, which, while it may have been caused by unskillful use of the forceps, is not infrequently caused by too great a delay in resorting to artificial delivery.

Uterine inertia is, of course, of greater importance in the second stage of labor, especially if the membranes are ruptured and the pressure of the uterus comes directly upon the child, than in the first stage, yet in several Cæsarean sections performed during a prolonged first stage the presence of meconium in the liquor amnii and the marked slowing of the fœtal heart prior to the operation have convinced me of danger to the fœtus from uterine inertia even during the first stage of labor.

Realizing that there is danger alike to mother and child if uterine inertia is greatly prolonged, two questions present themselves:

1. What is the cause of the inertia in the case at hand?

2. What is the best treatment?

In seeking the etiology of the condition one naturally asks, Is it due to a lack of nerve and muscle tone which is only a part of a general systemic lack of tone? Or is it due to a malposition of the presenting part as in an occipito-posterior position of the occiput, in which the absence of the well flexed head pressing upon the lower uterine segment deprives the uterus of the normal stimulus to firm contractions? Or, finally, is it due to a disproportion between the child and the passage so that the uterus, although it has done its best and is tired out, has a task too great for its accomplishment?

To apply the same method of treatment to each of these conditions would certainly be poor obstetrics.

One of the crying needs in obstetrics to-day is an earlier and clearer recognition of the exact conditions lying behind the behavior of the uterus called "inertia." The demand then is for accurate diagnosis and prognosis. Too often there are brought into our maternity hospitals cases with cervix torn, but undilated, perhaps with fœtus dead or dying, in which the physician in charge, mistaking an inertia needing rest for one needing immediate delivery, had introduced the forceps through an undilated cervix and attempted to deliver with the result mentioned above.

Too often one is called in consultation to find a case of so-called inertia which has had feeble nagging pains most of the day, or most of the night, and in which a careful examination reveals an occipito-posterior position in which a manual rotation of the head and the proper application of the forceps would have terminated the labor hours before with markedly less suffering to the mother and greater safety to the child.

It certainly is time to recognize the fact that occipito-posterior positions of the occiput are often associated with feeble, ineffectual uterine contractions.

The diagnosis can often be suspected, at least, from the description of the case over the

[1] Read before the American Gynecological Society, Washington, D. C., May 6, 1913.

telephone: "—many hours of labor with ineffectual pains and no advance." One plea of this paper is for an earlier diagnosis of posterior positions of the occiput which need artificial delivery.

Still again, too often are we brought face to face with neglected cases of uterine inertia in which the relation between child and parturient canal is such as to render delivery *per vias naturales* impossible and yet the uterus has been allowed to work away for hours against this impossible problem until the organ itself has become exhausted, the child's life endangered, and the operation of Cæsarean section which hours before would have easily saved the child with little risk to the mother now has associated with it a relatively high mortality.

In considering the treatment of uterine inertia it should be stated that it is not the intention of this paper to discuss that group of cases of inertia in which rest or the use of drugs such as strychnine, quinine, or pituitary extract suffice to accomplish the desired result.

The writer is free to admit that there are two main classes of inertia:

1. Those cases in which the above mentioned remedies are sufficient.

2. Those in which they will not accomplish the desired result.

He is further free to admit that since the introduction of the use of pituitary extract, the first class has been largely increased at the expense of the second, and many cases of easily rotating occipito-posterior positions have been changed to anterior positions, and many cases of mild dystocia have been overcome.

The problem of this paper, however, is to answer the title question. "Under what conditions should uterine inertia be treated by artificial delivery?"

In general, this question may be answered as follows: When either fœtal life or maternal convalescence is endangered.

FŒTAL DANGER

It would seem that by this time the importance of carefully noting the rapidity and quality of the fœtal heart sounds during labor would be generally recognized, and this simple precaution be uniformly and frequently observed, yet among general physicians who practice obstetrics this is not the case.

There is no criterion of the fœtal well-being which equals the character of the fœtal heart sounds, yet this criterion is often neglected.

The need of frequent observations of the fœtal heart sounds is in my judgment one of the deciding arguments in favor of the dorsal position of the woman in labor rather than the lateral position.

The lateral position requires frequent changes to the dorsal for proper auscultation and this means frequent disarrangement of the sterile drapery. The dorsal position needs no such change.

The excuse of many who neglect auscultation of the fœtal heart during the second stage of labor is that after they have put on their rubber gloves they cannot handle the stethoscope without unsterilizing their gloves.

If the obstetrician has with a stethoscope carefully auscultated the fœtal heart during the first stage of labor, it is not necessary for him to use the stethoscope during the second stage when his hands are sterile-gloved. For many years the writer has carefully and frequently auscultated the fœtal heart in the second stage of labor by raising with gloved hands the sterile towel usually kept on the patient's abdomen, and, having the nurse pull down the nightdress so as to cover the abdomen, with ear applied to the nightdress he has auscultated as desired; the nurse has then folded back the nightdress, he has replaced the sterile towel which he has been holding with sterile hands and this process has been repeated as often as necessary.

Of course the ear could be applied to the sterile abdominal towel, but its sterility is then destroyed and a fresh sterile towel must be substituted for it. As sterile towels in a private house are usually limited in number, it is usually necessary to conserve their use.

The importance of frequent auscultation of the fœtal heart during the second stage of labor may well be considered as great. It furnishes the chief criterion of the well-being or danger of the child and in uterine inertia if on auscultation the fœtal heart is found

markedly slowed and especially if with this lessened rate there is associated a well marked irregularity, fœtal danger is established and artificial delivery is indicated.

This does not necessarily mean that forceps delivery or version must be undertaken at once, or still less that one of the cutting operations for delivery in dystocia should be performed. It simply means that the labor should be expedited in the best way under the existing circumstances. If the cervix is still undilated and there is no dystocia from the hard parts, the use of the elastic bag until the labor can be more easily terminated by the forceps may be the best procedure.

On the other hand, if the examination discloses the fact that a posterior position of the occiput is the cause of the delay and the embarrassment of the fœtal circulation, artificial rotation and delivery are indicated.

In the presence of a slow, irregular fœtal heart a dystocia of the hard parts indicates a Cæsarean section unless this operation is contra-indicated by the feeble condition of the fœtal heart, the too long delayed decision to deliver artificially and the great probability that the woman is already infected.

Uterine inertia associated with fœtal heart sounds indicating danger to fœtal life is one of the first types of inertia indicating artificial delivery.

UTERINE INERTIA ENDANGERING MATERNAL CONVALESCENCE

If the membranes have ruptured, prolonged pressure of the child against the uterine wall or against the vagina or bladder, even if the pressure is not accompanied by uterine contractions powerful enough to accomplish any advance of the presenting part, may endanger maternal convalescence by post-partum hæmorrhage, by infection, by necrosis, or by an increased mortality of any operation resorted to for delivery.

In a certain class of women, with nervous system of unstable equilibrium, the nerve and muscle tone seem only equal to the task of dilating the cervix, perhaps not that. The immediate result is an exhausted woman, perhaps an hysterical woman, with labor only partly completed. If these patients are allowed to continue in their ineffective labor the remote result may be a nervous and physical wreck for a year or two after the birth of the child. In a certain number of these cases, simple measures as rest, reassurance, food, strychnine or quinine may overcome the difficulty, but in a larger number these measures fail.

This was the class and this the condition which usually indicated artificial delivery, usually by forceps, occasionally by version.

This class has in recent months, through the use of pituitary extract, been greatly reduced in the number of those needing artificial delivery, but there still remain a large number who should not be allowed to continue longer in labor for the two reasons already suggested.

1. The effect upon the maternal soft parts.
2. The effect upon the nervous system.

It would be extremely valuable if one could definitely outline the exact condition of the maternal soft parts which should always be taken as the indication for artificial assistance to nature's efforts at delivery, but this is almost impossible, as each case has to be studied by itself. In general, the dryness and beginning œdema of the cervix and vagina may be taken as an indication that the circulation and nutrition of the soft parts are being interfered with, and if, with membranes ruptured and labor well under way, no progress has been made for an hour in either dilatation or advance of the presenting part, and the simple measures of rest, food, and stimulating drugs have proven unavailing, artificial mechanical assistance is indicated.

The exact type of mechanical assistance to be chosen depends, as suggested earlier in this paper, upon the diagnosis of the conditions present. If the delay is caused by too great resistance in the bony canal and a disproportion between it and the fœtal head, now is the time for Cæsarean section rather than later after frequent manipulations have increased the mortality of the operation. If the inertia is due to too great resistance in the cervix, now is the time to make use of the valuable assistance of the elastic bag in both dilating the cervix and stimulating the contractions of the fundus.

If the presenting part has descended to the

pelvic floor and the resistance here has proven too great for the overworked uterus to overcome, now is the time for the use of the forceps before the maternal soft parts and the fœtal brain receive an undue amount of pressure.

While discussing, as an indication for artificial delivery, the effect of uterine inertia upon the nervous system of the mother in convalescence, it must not be thought that this indication is often found separate from the two already studied, i. e., fœtal danger and danger to the maternal soft parts. In fact two, if not three, of these indications are usually found associated. The nervously exhausted woman, perhaps hysterical in labor and neurasthenic for months afterward; the tired uterus which tends to relax, bleed and become infected after labor; and the fœtal heart slowed and irregular from undue pressure, these three conditions are so often found combined as to present a familiar picture to every consulting obstetrician. My plea is for studied, skilled, artificial assistance in delivery before the mother and child are exposed to these dangers.

There is one condition not usually classed as uterine inertia which the writer would like to call attention to before closing this paper. It is the long delay which sometimes intervenes between rupture of the membranes and the uterine contractions of the first stage of labor.

Patients sometimes present themselves at the hospital with the history that their membranes ruptured three, four, or even five days before their labor pains began. An unfortunate experience several years ago in which the fœtal heart ceased before the labor was completed, and a study of the temperature charts of a number of these cases, convinced me that in many particulars they resemble cases of uterine inertia during actual labor; that there is fœtal danger from interference with fœtal circulation from prolonged pressure, and that maternal morbidity is common from sapræmia if not from bacteræmia.

For these reasons the writer has made it a rule in recent years both at the Sloane Hospital and in his private practice to introduce an elastic bag (Voorhees) into the cervix if uterine contractions have not started at the end of 24 hours from the time of the rupture of the membranes.

The elastic bag as a rule not only brings on uterine contractions, but lessens the further escape of the liquor amnii, and the results, both fœtal and maternal, have seemed to justify the procedure.

IODINE IN STERILIZATION OF THE SKIN[1]

By HUNTER ROBB, M. D., Cleveland
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ALTHOUGH iodine has long been used as a local antiseptic, the present interest in its value in the preparation of the skin for operations really takes its origin from the valuable paper of Grossick.[2] Already in 1906, in the Philippines, Major Woodbury, U.S.A.,[3] had employed tincture of iodine following the use of soap, water, ether, and alcohol, in the preparation of the field before doing a Cæsarean operation. Mann, of Buffalo, is in the habit of applying a coat of iodine to the skin at the time of closure of an abdominal incision; and this custom of his dates back many years. The essential value of the work of Grossick lies in the fact that he was the first to point out that the skin must be absolutely dry before the iodine is applied, otherwise the swelling of the upper epithelial layers will prevent the drug from penetrating the glands and hair follicles, and will thus rob it of all chance to act as an effective germicide. Many operators have insisted upon a preliminary scrubbing of the skin with soap and water, and others apply soap poultices or bichloride pads for some hours before painting on the iodine. Any such method, Grossick believes, entirely destroys the effectiveness of the iodine.

The revival of interest in the subject has produced quite an extensive literature. Turner and Catto[4] have reported some thirty-two cases tested bacteriologically. In some a 2.5 per cent alcoholic tincture was used; and in others, a 3 per cent solution of iodine in potassium iodide was applied. Cultures were made by cutting strips from the entire thickness of the skin. These, with the adherent iodine, were then incubated in broth culture media.

A valuable contribution upon the subject from this country is that of Bovée[5] who employed the official tincture of iodine diluted with ethyl alcohol in varying percentages, 50, 40, 30, 20, 10 and 5. This was applied after shaving, and a second coat was painted on and allowed to dry just before the operation was started. Scraping cultures were then made every fifteen minutes till the operation ended. In other cases, silk sutures were drawn through the skin and bits of them dropped into culture media. After citing his statistics, Dr. Bovée concludes that so far as his cultures prove anything, they indicate that "weak dilutions of iodine, even to 5 per cent of the official tincture, thoroughly sterilize the surface of the skin after a period of time from two to fifteen minutes from its application." It may be noted that in Dr. Bovée's work, the *cultures were all taken from skin still coated with the iodine.*

It occurred to us that possibly even a small amount of iodine present in a culture medium might inhibit the growth of certain organisms which may be present. If this be the fact, negative cultures in such experiments as those mentioned above would not necessarily prove that all bacterial life in the skin had been destroyed. It would merely indicate that such life is either killed outright, or, if still surviving, is unable to develop in the unfavorable environment of broth containing a certain amount of iodine. But we must realize at once that, from the standpoint of the careful surgeon, such uncertainty as to the fate of bacterial forms on the skin is highly unsatisfactory. If such forms do maintain life in spite of the iodine, we know that at operation some are apt to be carried into the peritoneal cavity and elsewhere. There the lymphatics will rapidly absorb the iodine which has accompanied them, and freed from its inhibiting influence the organisms may perfectly well go on to a dangerous development.

With these problems in mind, we have recently carried out experiments with the iodine method of preparing the skin, at first upon

[2] Zentralbl. f. Chir., 1908, Oct. 31, No. 44, 1286.
[3] N. Y. M. J., 1907, lxxxv, 838.
[4] Lancet, Lond., March 18, 1911.
[5] Am. J. Obst., N. Y., 1911, lxiv,

[1] Read before the American Gynecological Society, Washington, D.C., May 6, 1913.

dogs, and later upon human beings. We have not yet, however, felt justified in operating upon human beings through a field prepared only with the tincture of iodine; in the cases reported, the cultures were either taken in the ward, apart from any operation, or else they were taken in the operating room from some specially prepared field other than that through which the operation was being performed. In most such cases, the cultures were taken from the anterior abdominal wall when the patient was having plastic work done upon the perineum. In the dog experiments the cultures were taken from the field through which the abdominal incision was made a few minutes later.

Various methods of removing the iodine after it had dried on, without contaminating the field, were considered. Alcohol is the most effective agent; but it was rejected because alcohol has itself a distinct bactericidal power. Hyposulphite of sodium forms with iodine the soluble sodium iodide, which may be washed off with sterile water. This works best when the solution is quite warm, but we have not found it as effective as a solution of potassium iodide. This substance, in a 10 per cent solution, can be thoroughly sterilized by boiling, and acts as a good solvent for the dried iodine. Later, the surface is flushed off with sterile water.

Some experiments upon dogs were performed by taking cultures after the untouched skin had simply been painted over twice with a 50 per cent solution of the official tincture of iodine. The first coat was allowed to dry thoroughly before the second coat was applied, and all the preparation was done after the dog had been etherized and placed upon the table. One dog so treated had a tiny granulating spot in the scar of a former abdominal section. In this case, B. proteus, staph. albus, and streptococcus grew from the culture made from the area coated with iodine. From the area freed from iodine by the application of a 10 per cent potassium iodide solution, however, a streptococcus alone was grown. Four dogs thus treated were quite free from any sore or granulating area upon the skin at the time of the experiments. The cultures in these cases — as elsewhere unless specially stated — were made by scraping the skin with a boiled knife until serum and a little blood began to exude. The scrapings were then transferred to a broth culture tube, and examined after a 48 and again after a 72 hours' incubation. From the areas painted with iodine, no growth at all was obtained 3 times. B. subtilis was grown twice, and B. coli and staph. albus once each. From silks drawn on a needle through all depths of the skin thus coated with iodine, B. subtilis was obtained once, and one culture proved sterile. Scraping cultures from areas from which the iodine had been removed with 10 per cent potassium iodide, gave B. subtilis twice and staph. albus four times. It is of interest to note that none of these cultures was sterile — a sharp contrast to the three sterile cultures mentioned above as taken from these same dogs, but from areas still covered with dried iodine.

In another group of dog cases the technique of skin preparation was somewhat different, and this second method is also the one that has been employed in all the experiments upon human beings. The skin was first scrubbed with benzine; and then a mixture of one part of crystals of iodine in 1000 parts of benzine was applied and allowed to dry. Then a coat of a 50 per cent solution of the official tincture of iodine (diluted with 95 per cent alcohol) was applied, allowed to dry, and a second coat was then painted on. Scraping cultures were then taken, after which the iodine was removed with the 10 per cent potassium iodide solution, the skin was flushed with sterile water and allowed to dry. Other cultures were then taken. Three of these dogs showed small, unhealed areas in the scars of former abdominal sections. Cultures from the painted areas in these dogs were sterile once, and showed staph. albus twice. After the iodine had been removed with 10 per cent potassium iodide, all three cultures showed staph. albus. A stitch drawn through all layers of the skin in one of these dogs also showed staph. albus.

Nine dogs either had had no previous operation, or else the incisions of those earlier operations had entirely healed. Cultures were taken from these nine, after the skin had been prepared according to the above technique.

In seven the painted surface proved sterile. In only one case was the culture sterile after the removal of the iodine with potassium iodide solution. Staph. albus was found three times, and an unidentified form once, upon the painted surface. Upon the fields after removal of the iodine, staph. albus was found seven times; B. proteus once; B. subtilis once; and an unidentified bacillus once.

To summarize the results of the experiments upon dogs: In all, cultures were made from fifteen animals. Where iodine was present upon the skin, the following were the cultural results:

Sterile	11 = 73.7%
Staph. albus	7 = 46.9%
B. proteus	1 = 6.7%
B. subtilis	1 = 6.7%
Unidentified	1 = 6.7%

After the removal of the iodine from the skin by the use of 10 per cent potassium iodide solution the results were as follows:

Sterile	1 = 6.7%
Staph. albus	13 = 87.1%
B. proteus	1 = 6.7%
Streptococcus	1 = 6.7%
B. subtilis	1 = 6.7%
Unidentified	1 = 6.7%

Let us now turn to our results with cultures from human beings. As has been mentioned, some were taken in the ward without anæsthesia, the scraping required causing no more pain than an ordinary vaccination. Others were taken in the operating room, just before plastic operations, with the patients under surgical anæsthesia. The technique in all cases was as rigid as possible. The use of benzine, followed by benzine and iodine, and then by two coats of tincture of iodine, 50 per cent, has been the only technique we have employed upon human beings.

In all, experiments have so far been conducted upon 21 patients. Where the iodine was present upon the skin we had the following cultural results:

Sterile	18 = 86.4%
Staph. albus	1 = 4.8%
Streptococcus	1 = 4.8%
B. proteus	1 = 4.8%

After removal of the iodine with the 10 per cent potassium iodide solution the following results were obtained:

Sterile	12 = 57.6%
Staph. albus	7 = 33.6%
B. coli	1 = 4.8%
Unidentified	1 = 4.8%

As control experiments, cultures were made in the same manner from the abdominal walls of patients who had received no preparation of the skin whatever except a tub bath from ten to twelve hours previously. Abundant growths of all sorts of organisms were obtained from all these six patients. Six cultures gave unidentified forms. Staph. albus appeared 4 times; B. subtilis 3 times; B. coli twice; and sarcinæ once.

In order to know the action of tincture of iodine upon bacterial forms growing *in vitro*, some further experiments were carried out, to test the results of Senn and of Kinnaman. Three drops of a 50 per cent solution of the official tincture of iodine were added to a growing 48-hour broth culture of staph. albus. At the end of 24 hours' incubation, no living organisms could be found in the tube. Again, on two occasions, broth subcultures of staph. albus were started, three drops of a 50 per cent solution of the official tincture of iodine being added at the time the organisms were planted. In both cases, there was no growth after 48 hours' incubation, though control tubes, started at the same time, but with no iodine added, gave good growths in each instance. Were the organisms killed, or simply inhibited in their development? To settle this question the following experiments were made: Well-grown agar cultures of streptococcus, staph. albus, and B. coli were employed. A platinum loopful of the culture was thoroughly agitated in ten minims of a 10 per cent solution of the official tincture of iodine for two minutes. A loopful of this was carried over into ten minims of sterile water, and the liquid thoroughly agitated. Finally, a loopful of the water was transferred to a tube of melted agar, and the latter was rolled on ice to form an Esmarch tube. The same thing was done using a 5 per cent and a 50 per cent solution of the official tincture of iodine instead of a 10 per cent. The tubes were incubated 48 hours, and examined with the following results, expressed in numbers of colonies on a square centimeter of surface:

	Colon	Staph. Albus.	Strept.
5% official tr. iodine washed off	57	92+	115+
10% official tr. iodine washed off	*	6+	98+
50% official tr. iodine washed off	128	8	35

* Too overgrown to count colonies.

Does the older and more complex method of cleaning the skin give any better results than that obtained with the iodine? The method of cleaning the dogs, in use before the iodine was tested, had consisted in a shave, followed by a five minutes' scrub with a sterile brush, soap, and water. Ether and alcohol were then applied, and finally a pad of 1–1000 bichloride of mercury was left on the abdomen for 10 to 15 minutes before the operation was started. Of the 36 operations conducted with this technique, 31 or 86 per cent showed absolutely perfect first intent healing of the incisions. Of dogs operated under the iodine technique there were 14. Of these, only 5, or 36 per cent, showed a perfect healing.

Robb and Ghriskey, in 1891[1] tested several methods of cleaning the skin. In regard to the use of permanganate of potassium, followed by oxalic acid and bichloride of mercury, they report, "The bacteriological examination of the skin thus treated, even after the mercury has been precipitated, yields almost uniformly negative results."

The method of preparing the abdomen for abdominal section employed on the gynecological service of the Lakeside Hospital, Cleveland, consists of a shave and scrub the night before operation. This is followed by the application of a soap poultice for several hours. Then comes a second scrub, and the application of a pad soaked in 1–1000 bichloride of mercury. This pad is removed when the patient reaches the operating table. The skin receives another thorough scrub, followed by the application of ether and alcohol, and then another bichloride pad is put on. Tests were made from the skin of 11 patients so prepared. The bichloride of mercury was first precipitated with sterile ammonium sulphide. The skin was flushed off with sterile water, dried, and the scraping culture made and planted in broth. No growth was obtained from ten of them. One showed staph. albus.

[1] Am. J. Obst. N. Y., 26, p. 844.

CONCLUSIONS

1. There is still no certain method of sterilizing the skin.

2. Tincture of iodine in all probability possesses a definite inhibitory action upon the growth of bacterial forms.

3. Sterilization with tincture of iodine is not to be relied upon, and should be used only when more elaborate forms of sterilization are contra-indicated.

It gives me great pleasure to acknowledge the valuable help of my associate, Dr. Joseph T. Smith, Jr., in the preparation of this paper.

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UTERINE CARCINOMA: ANOTHER HYPOTHESIS AS TO ITS CAUSE AND PREVENTION[1]

By A. F. A. KING, M. D., LL. D., Washington, D. C.

BEFORE proceeding with the subject of *uterine* cancer it is my wish to present some ideas on the origin and prevention of cancer in general. In accordance with the hypothesis to be considered, two factors are necessary to produce cancer, viz., *first*, the transformation of somatic (asexual) cells into reproductive (sexual) cells; *second*, the fertilization of these transformed somatic cells by spermatozoa. From this fertilization result abortive attempts in the direction of embryological development: hence the pseudo-embryonic structures so strikingly characteristic of cancer. What *caused* the somatic asexual cells to change into reproductive sexual ones? Abnormally *rapid cell proliferation*, produced by long continued irritation of one or more kinds, whether mechanical, chemical, functional, actinic, X-rays, etc.

The cells of our own bodies seem to be endowed with the same proclivities, and with a tendency to follow the same life-history as belonged to our ancestral progenitors, the *Protozoa*; these one-celled creatures multiply by direct division (amitosis), generation after generation, until "senescence" approaches when the capacity for any further multiplication is about to cease, but as the result of this long continued succession of proliferations some of the cells become transformed into reproductive sexual cells, by the fertilization of which a new generation, with rejuvenated powers of cell division, is produced and extinction of the race is prevented — "the rejuvenescence of Maupas."

This agrees with the age-incidence of cancer: the disease occurs late in life, after the affected tissues have been subjected to *long continued irritation* and consequent rapidly successive cell proliferations; hence, eventually, "senescence" and production of sexual cells, as in Protozoa. In Protozoa this is normal: in man it is disease.

Is cancer a parasitic disease? Are the so-called cancer cells that make up the mass of a malignant neoplasm, parasites? It *is* a parasitic disease, and the cancer cells *are* parasites, just as much so as an embryo *in utero* is a parasite, which indeed it is, essentially, and in every particular, but it is a normal parasite, in its proper place at the proper time, and will remain so until it becomes a newborn child — the normal outcome of the fertilization of a germinal epithelial cell (ovule) by a spermatozoön. The cancer parasites, the parasitic cells resulting from the fertilization of a somatic epithelial mucous cell, and its subsequent segmentations and divisions, have *no* normal time or place for their existence; though exhibiting abortive attempts towards embryological evolution, they never go farther than the earliest stages of *trophoblastic* development — the preparatory nutrient scaffolding (so to speak) by which the body of the future embryo, if there were one, is to be nourished and built up. In normal impregnation there is *only one* embryo parasite; while the abortive pseudo-embryonic parasites produced by the simultaneous, or successive, conjugation of *many* spermatozoa with *many* epithelial cells, number hundreds and thousands, and thus results a complete host of these abortive pseudo-embryonic individuals, each contending with the other, and thus constituting the "histological mob" of "unruly cells run riot" that so many cancer microscopists have described. A bit of proliferated tissue large enough to be visible to the naked eye must contain thousands and millions of rejuvenated epithelial cells whose conjugation with spermatozoa would produce cancer; and in like manner if instead of having only one impregnated ovum in a uterus, there were thousands and millions of them, the product would never be a normal embryo; it too, would be cancer, nothing else. Thus the element of *number*

[1] Read before the American Gynecological Society, Washington, D. C., May 6, 1913.

must be borne in mind; the difference between one fertilized cell as in normal gestation, and the product of a million fertilized cells as in cancer, becomes extremely important.

We all realize, I think, that there is no such thing as a "specific cancer-cell," nor have we any really good definition of "*malignancy*." The microscopist makes his diagnosis of cancer, not so much from any particular cell, but rather from the relations of the suspected growth with surrounding tissues, especially by finding epithelial cells, gland-cells, etc., in places where they ought *not* to be — that is to say, not on a *surface* (the *normal* place for epithelial cells) but buried, like parasites (in "nests," etc.,), *beneath* the surface. This agrees with our own idea of cancer, viz., that the cancer mass (in carcinoma) is a buried mass of fertilized epithelial cells — a mass of incipient abortive ectopic impregnated quasi-ovules, which are attempting to undergo development into embryonic "ectoderm" and "entoderm." Each fertilized epithelial cell is what we might call, therefore, an embryo "*in embryo*," and it never goes much further. Should it proceed far enough to develop "mesoderm," this would initiate the trabecular frame-work of cancer— the sarcomatous, or connective tissue elements (which last are less disastrous to the host — less malignant, we usually say) — because connective tissue is "at home" *everywhere* in the body and does no great harm, while the *only* harmless place for epithelial growths is upon mucous or cutaneous surfaces.

Is the "microbic theory" of cancer true? If so, what is the microbe, and does it originate within, or invade the body from without? The microbic theory *is* true; the microbe comes from without: *it is the spermatozoön*.

This is the frame-work of the hypothesis to be considered. So far, what I have said seems to be a purely imaginary conception, a "library study," without any supporting observations or experiments. This I confess so far, and I should like to confess also that in discussing the problem further, I am compelled to deal with branches of biology, viz., embryology, histology, cytology, etc., my own knowledge of which is extremely limited, or, to be more exactly truthful, it will no doubt be observed by those better informed on these subjects that my ignorance is quite evident. Perhaps for this reason, I have made numerous blunders.

However, as best I can, let me now present the conclusions of others — of men whose intelligent and comprehensive study of cancer far exceeds any effort of mine, and whose brilliant experiments demonstrate the foundation facts upon which my hypothesis rests.

E. H. Nichols (1) remarks that cancer is a parasitic growth engrafted on a sound individual, this growth having been produced by the conjugation of sexual cells in a way analogous to the conjugation of sexual cells which produce a normal individual.

Bland-Sutton (2) says the cause of cancer is most probably a micro-parasite which stimulates the normal epithelial cells of adult individuals to multiply and produce cancer in the same way that the male gamete or spermatozoön initiates reproductive changes in the female gamete or ovum.

Klebs reached the conclusion that "leucocytes present within the epithelium cells of cancer exert a spermatic property by which they fertilize the epithelium cells, so awakening within them renewed activity of proliferation, conferring on them, in fact, the properties of fertilized ovum cells."

Dr. J. Jackson Clarke (3), commenting on this conclusion of Klebs, remarks: "There is *no evidence whatever* that leucocytes play any such part."

In 1905 Farmer, Moore, and Walker (4) observed leucocytes, during the earlier stages of cancer, passing into tissue cells, with the result that "mucous cells were directly converted into cells of a truly malignant type."

W. Roger Williams in his splendid treatise on the "Natural History of Cancer" (5), tells us that "pathologists have long been familiar with the conception which ascribed the initiation of malignant growth to the conjugation of the cell of a cancer germ, with some adjacent somatic cell, as described by Stroebe, Hanseman, Klebs and others." Dr. Williams adds that this doctrine has not carried much conviction.

Sir Alfred Pearce Gould in his Bradshaw

Lecture on Cancer (6) reminds us that his predecessor, Sir William Savory, pronounced the cancer cell to be an "embryonic" or "rudimentary" form of cell, possessing great powers of multiplication but differing from true embryonic cells in its lack of power of differentiation.

Dr. Gould, after a prolonged discussion, finally reaches the question, "What then is cancer?" Before answering, he says, think of a fertilized human ovum. Picture its dividing into 2, 4, 8, 16, and 32 cells, etc., and so he proceeds to describe its development into a full-grown individual; then, in summarizing the facts of cancer, he concludes that cancer results from a breach of fundamental cell-law; a law, obedience to which results in the perfect development of an individual but disobedience to which "slowly spells out all the inscrutable woes of cancer." In both instances, let us note, the process is regarded as one of embryonic development in one case, *normal* embryonic evolution producing a fœtus; in the other an *abortive* embryonic process producing cancer. If we, to-day, ask what was the *origin* of these two processes, there seems no reason why it should not be *alike in both*, viz., the fertilization of an epithelial cell (germinal or somatic) by a spermatozoön. There is no other conceivable way, within our present knowledge, by which embryonic development could be initiated.

Once more J. Beard (7), referring to the cleavage of an impregnated ovum, accentuates the fact that of the products of this cleavage not more than a one-eighth part goes to evolve an embryo, while the *other* seven parts are trophoblastic in nature, and never at any time enter into the formation of an embryo body. These seven parts possess characters and potentialities the very antitheses of embryo or soma; that is, a small fractional part of the cleaved egg is embryonic in nature and destiny, and seven eighths are the very opposite of this, or trophoblastic, the *equivalent of cancer, morphologically, biologically, embryologically and chemically*. These are facts, not fables. (*Italics mine.*)

In discussing the dynamic energy of cells (resulting from metabolism) and its normal proportionate distribution between *growth* and *functional activity*, Drs. W. T. Howard and O. T. Schultz[1] conclude that the main and essential differences between the cells of malignant tumors and other cells consist of a disturbance in this normally proportionate distribution of energy, so that too *much* is expended upon cell-*growth*, and too *little* in *functional* activity. We have only to remark that this *abnormal* disposition to grow rapidly, and perform but little function on the part of cancer cells, is the *normal* condition of developing fœtal cells undergoing embryonic evolution *in utero*. Thus again the resemblance between embryo cells and cancer cells is unmistakable.

Among other resemblances between the cancer cell and its embryonic prototype are its globular shape, its comparatively large nucleus, its homogeneous protoplasm and large proportion of glycogen, as mentioned by Dr. Bland-Sutton ("Tumors," p. 284) and others.

So much then for the cancer cells being abnormal parasitic *embryonic* formations.

It will be noted that some of the observers mentioned refer the fertilizing power to leucocytes, not to sperm. Naturally I agree with Clarke that there is no evidence that leucocytes possess this power. And, at the risk of being considered audaciously presumptuous, I should like to suggest that possibly what these gentlemen considered to be leucocytes may really have been the heads of spermatozoa; this for the reason, *first*, that they *did* fertilize the epithelial cells; and *second*, that noné of the observers mentioned, nor anyone else, has ever seen what they knew to be a spermatozoön enter an epithelial cell (whether germinal or somatic), hence no one can know positively what it would look like or how it would comport itself. In some lower forms of life, the spermatozoön loses its flagellum *before* entering the ovum, and having entered, it changes its shape, enlarges, swells up and becomes globular, thus resembling a leucocyte. Again to become a reproductive (sexual) cell, the leucocyte must reduce its chromosomes;

[1] Chemical and Pathological Papers, Lakeside Hospital, Cleveland, Ohio, v, 1912, pp. 48-52.

there is no evidence of this, while we know the spermatozoön *has* done so. Finally, Howard and Schultz[1] tell us that the mere presence of leucocytes within tumor cells is far from being convincing evidence of copulation, and give their reasons for this conclusion, which I need not repeat.

To become sexual cells, capable of conjugation, the somatic cells must reduce their chromosomes (the "maturation" process). Now Farmer, Moore, and Walker (8), whose brilliant experiments are so frequently referred to in the recent literature of cancer, assert that in malignant growths they have *never failed* to find these cells with reduced chromosomes, but in benign growths they have been wholly unable to find a *single instance of cells* (italics mine) in which a reduction of chromosomes had taken place. Thus, then, there is experimental proof that in cancer, somatic cells *have* been transformed into reproductive (sexual) cells, capable of conjugation, and also that the cancer cells themselves are parasitic pseudo-embryonic growths such as would be likely to result from fertilization of these transformed epithelium cells as before mentioned.

In this line of argument, however there is one apparently unwarrantable assumption which I must explain, viz., the assumption that the transformed somatic cells are all *females*, with which spermatozoa can conjugate. The rejuvenescence of Maupas requires that *both* male and female cells should appear. But they do not: to produce a male requires that an epithelium cell should be transformed into a "mother sperm cell" and then pass through all the phases of spermatogenesis; in fact, it should produce microgametic sporozoa, i. e., the cytologic equivalents of spermatozoa. Now spermatogenesis is one of the most complicated processes in the whole domain of cell development, and it is no wonder that, under the abnormal conditions we are here considering, the spermatogenetic effort should end in *abortive* products, and these abortive products are probably some of the so-called "*cancer-bodies*," notably Plimmer's bodies, "Altman's granules," and many others. C. E. Walker (9) tells us that "certain vesicular structures that appear regularly during normal development of the male reproductive elements in man and other vertebrates are *structurally identical* with and arise in a similar manner to Plimmer's bodies" in cancer. He adds: "A brief sketch of these vesicular structures as found during the process of spermatogenesis will make reasons for the comparison between them and 'Plimmer's bodies' evident." Several other observers, viz., Pianese, Borrell, Greenough, Farmer, Moore and Walker have also recognized the close similarity between "cancer-bodies" and the developing sperm-cells of mammalia (10). The "cancer-bodies" then, it would seem, are products of cell degeneration of abortive spermatogenesis. The genesis of *male* elements is not complete; whereas epithelial somatic cells that develop into *female* reproductive cells have only to rest, assimilate nutriment, and reduce their chromosomes by discharge of "polar globules," and they are ready to receive the fertilizing male. The "cancer-bodies" to which I have referred, while always found in cancer, and in many other fields where abortive spermatogenesis is going on, have no fertilizing power,— no power to initiate the segmentation of an epithelial cell and thus originate the parasitic pseudo-embryonic cancer cells. For this end, a *real* spermatozoön is necessary. Thus a troop of spermatozoa, invading a field at a time when they ought not to be there, namely the reproductive canal of a woman *after* the menopause, and finding no ovule with which to conjugate (as might have happened *before* the menopause), proceed to exercise their conjugal gallantries (if I may speak figuratively) by assaulting *a whole cluster* of freshly rejuvenated and "maturated" female somatic cells; and from this (shall we say?) *incestuous* conjugation result the hybrid heterotypical, abortive embryonic structures which constitute cancer. It may be here accentuated that the cells resulting from the segmentation of such a fertilized epithelium cell are parasitic, like the cells of an embryo. Hence we are able to realize and explain the conclusion to which so many inquirers after the origin of the cancer parasite and the source whence

[1] Lakeside Hospital Papers, Cleveland Series, v, 1912, p. 67.

it comes have arrived, viz., the conclusion that "the cancer cell *itself is* the parasite."

Uterine Cancer. If we now apply these principles of causation to the occurrence of uterine cancer, it will at once be seen that the etiological factors which my hypothesis requires, viz., (1) increased cell proliferation, produced by continued irritation, and (2) exposure of these proliferated tissues to the fertilizing influence of spermatozoa — to, in fact, what may be called "*spermatic infection*" — are nowhere more frequently present than in the cervix uteri; and surely no part of the human body is more liable to cancer than this same cervix uteri, upon which these two etiological factors so frequently exert their combined influence.

The sources of "continued irritation" and its consequent "cell proliferation," as regards the cervix uteri, are well known; for example, chronic endocervicitis, the proliferations incident to the catamenial periods; the lacerations, ulcerations, erosions, and proliferation of healing and cicatrization, incident to child-birth; to be repeated perhaps at successive labors: all these are sufficiently well known and there are many others. Note, again, that cancer only occurs, usually, after these "irritations" and "proliferations" have continued a long time: hence *young* women escape the disease (exceptions possible). It *requires time* for the abnormally repeated cell proliferations to approach the "senescent" period and thus develop *reproductive* cells capable of conjugation, as before explained.

With regard to the "spermatic infection" factor it may be noted that cancer of the uterus *does not occur in virgins*. Bonney (11), in his report of 1,876 uterine cancer cases at the Middlesex Hospital Cancer Research Laboratory, found that only 9 per cent of the women had *not* borne children, and that clinically a case in an undoubted virgin was almost unknown. W. Roger Williams (12) reports that of 156 uterine cancer cases under his observation, only ten were single; and of 168 cases tabulated by West and Duncan, only three were single. There is no evidence, one way or the other, that these single women were virgins, however; they may or may not have been. Moreover, it is possible that cancer of the uterus may occur, as may pregnancy itself, as I have tried to explain in a previous paper (13) without *coitus*, the spermatozoa making their entrance into the vagina, by means of an "intermediary host," such as, for example, the warm water of a bath-tub in which *one drop* of seminal fluid may have diffused 5,470,877 spermatic elements, as shown by the conjoint enumerations of Lode, Benedict, and Guelliott (14). How many more millions may have been contributed, by larger quantities of semen, such as in retrofluences from the vagina of a previous bather, or by other means, need not be considered in detail. One fact, mentioned by Williams (15), seems at first sight to militate against this idea of "spermatic infection" being an etiological factor in uterine cancer, viz., the fact that in prostitutes (the prostitutes of London, at any rate, referred to by Dr. Williams) cancer of the uterus is *not* especially frequent. This may be explicable, however, by recalling that these unfortunate women begin their dissipated lives while yet in their early teens or even sooner, and probably *die early*, before reaching an age when cancer is most liable to occur.

Among the other findings in the cytology of cancer have been *trophoblastic cells*, almost exactly like the trophoblast cells in the peripherel zone of an embryonic ectoderm (16). We must now note that the action of these two sets of trophoblast cells upon surrounding tissues is the same. Thus the embryonic trophoblast "corrodes" and destroys the decidua with which it comes in contact, and so buries the ovum in the uterine mucosa; and, as this process of phagocitic cytolysis continues, blood vessels are corroded and opened, and then occur actual but diminutive local hæmorrhages — the beginnings of those blood lacunæ that contribute to placental formation. In cancer we note this *same destruction and corrosion* of surrounding tissues, and the same involvement and opening of blood vessels by which the hæmorrhages of cancer are produced.

There is one form of uterine cancer that has never been known to occur without the instrumentality of a spermatozoön, viz.,

chorion-epithelioma (syncytioma malignum), which is the product of pregnancy, and which occurs so often as a sequel of hydatidiform moles. In these cases there is *no fœtus* — the embryo body has usually died early and disappeared, while the trophoblastic tissues developed from the non-embryonic area of the blastodermic vesicle continue to grow in an abortive and erratic manner, constituting cancer. So in the forms of cancer that occur *without* a previous pregnancy, there is again *no fœtal body*, because the fertilized epithelium cell never develops far enough to form an embryonic soma: it is only the trophoblastic tissues corresponding with those arising normally from the non-embryonic portion of a blastodermic vesicle that accomplish their abortive evolution. In this case no embryo ever appeared; in the chorion-epithelioma case an early embryo appeared, but soon *dis*appeared; in both cases the malignant growths consist of embryonic appendages, without any embryo; and in both cases the father of the growth was a spermatozoön.

Again, the age-incidence, in the two sets of cases, confirms this view, viz., the time for the most frequent occurrence of chorion-epithelioma is between 20 and 30 years, when *ovules* are most likely to be present; while in cancer cases (*not* derived from an immediately preceding pregnancy) the age-incidence is much later, i. e., after time has been allowed for somatic epithelium cells to have been transformed into sexual ones, by *long continued* irritation, etc.

What is the cancer "cachexia," so-called? Apart from the impaired nutrition resulting from anæmia following hæmorrhage, and the continued pain, may we not say that it is a toxic condition due in part to the metabolism of parasitic pseudo-embryonic cancer cells, analogous with the toxæmia of pregnancy produced by faulty fœtal metabolism? The cancer cells are living individuals (*quasi*-embryos); they not only absorb nutriment, but they also excrete, and some of them die and disintegrate. Thus they use their host (figuratively speaking) as a refectory, a lavatory and a cemetery, hence the toxic "cachexia"— so-called.

We now come to the question as to whether it would be advisable to amputate the cervix uteri before cancer begins, in those women who are approaching the cancer age, and in whom prolonged irritation of the uterine tissues makes it likely that malignant growths are liable to occur.

In favor of such a proceeding it may be said: (1) the operation is a comparatively trivial one and devoid of danger; (2) the cervix is a useless organ — certainly so late in life — and those from whom it has been taken away suffer no consequent deprivation or inconvenience.

On the other hand, it remains to be determined whether, after the operation, the cicatricial tissues, that have undergone the "proliferation of healing," would themselves be as likely or more likely to become the seat of cancer than the tissues removed by the operation. Without further argument the question is now submitted to your consideration. It is simply a suggestion, growing out of the etiological views already stated in this paper.

With regard to the second question as to whether women approaching the cancer age, who have had prolonged irritation of the cervix from any cause, should avoid the risks of "spermatic infection" by abstaining from marital relations, and thus avoid the fertilization of their epithelial cells by spermatozoa, it may be said that after the menopause, when there are no ovules to be impregnated, the sexual act, considered as a *procreative* function, is quite useless, or, we might say, "physiologically ridiculous."

There are, however, other women, in whom the menopause has not yet occurred, but in whom the condition of "senescence" of the uterine tissues has been prematurely induced by prolonged continued irritation with its consequent abnormally rapid cell proliferation — the etiological prelude of cancer: shall we advise marital abstinence in these cases also? This suggestion is submitted for your consideration.

Finally, cancer differs from most or at least from many other diseases in having no ulterior useful purpose. It confers no immunity; it secures no improved adaptation to

surrounding conditions; it is in no sense benign but in every sense malignant; it is in no way conservative but in every sense destructive. From what dreadful violation of natural law can such a prodigy of evil have derived its origin?

Of one set of cases, at least, it may be said: If men will insist on disobeying the natural instincts of "sexual selection," and ally themselves with women in "the sear and yellow leaf" of existence, the hieroglyphic lines upon whose wrinkled features distinctly proclaim the warning, "*Procreative department permanently closed*," then it need not surprise us to find that the offspring of this *abnormal* union should sometimes be a *cancer* instead of a *child*.

Besides the fertilization of epithelium cells by human spermatozoa, there is reason to suspect that the sperm of *other animals* may act in a similar manner. Dr. H. D. Walker of Buffalo, N. Y., has reached the conclusion that the spermatozoa of common earth worms act upon human epithelium cells to incite their development into cancer cells. His elaborate paper in the *Am. J. Dermat. & Gen.-Urin. Dis.*, 1911, xv, pp. 642-648, is ably sustained by experiments which, however, were only successful when he used those segments of the worm containing the spermatic organs, and he regarded the spermatozoa of the worm as the active agents in producing cancer. The association of other kinds of worms with cancer has long ago been noted by Haaland, Borrell, Bashford and Murray, and more recently by Prof. Joannes Fibiger, as noted by E. F. Bashford, in *Nature*, Feb. 27, 1913, pp. 701-702. (See also *J. Am. M. Ass.*, March 22, 1913, p. 948.) The "worm-factor" in cancer has been, however, ignored and neglected. Perhaps it may be profitably revived when considered in relation with "spermatic infection."

In the preparation of this, and of my former paper, I beg to acknowledge my great indebtedness to the library of the Surgeon-General's office, and to the kind attention given me by Lt.-Colonel Walter D. McCaw, Dr. Fielding H. Garrison, and Messrs. Israeli, Torpper and Calvert, their assistants in the library.

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FACTORS IN THE FORMATION OF SKIN STRIATIONS DURING PREGNANCY[1]

By FRED J. TAUSSIG, M. D., Saint Louis
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THIRTY-THREE years ago Dr. S. C. Busey of Washington presented a paper before this society on the "Cicatrices of Pregnancy," in which he discussed very ably the histopathology of skin striations. Since that time I do not believe the subject has ever been mentioned in our meetings.

It is the ideal of the obstetrician to bring his patient through pregnancy and labor in such manner that she may be left at the end of that time in approximately the same physical condition as before gestation set in. This can of course be only relatively attainable. He is accustomed to lay much stress upon the strength of the pelvic floor, the intactness of the cervix, the position of the uterus and the firmness of the abdominal wall. Of secondary importance, to be sure, is the condition of the skin of the abdomen, breasts, and thighs; and yet it should not be entirely neglected as is usually the case. The investigations of the present paper tend to show that this is of more than mere cosmetic importance. But considered only from the cosmetic side it is deserving of greater attention. The personal satisfaction, call it vanity if you like, that women manifest in the smoothness of their skin, has its justification, and many women dread motherhood for this very reason. But apart from this, are we surgeons not very inconsistent when we lay as much stress as we do upon a beautiful linear scar and neglect proper precautions to avoid the multiple broad linear scars that appear in many parts of the body during pregnancy? Is there not a little vanity of our own entering into this discussion of subcuticular stitch, of skin clips, etc., to get a beautiful looking wound? We are accustomed to emphasize as one of the advantages of the Alexander operation and the Pfannenstiel incision that the scar is thereby concealed by the pubic hairs, and yet we pay no special attention to avoiding the more prominent—and to my mind, almost equally preventable—striations of pregnancy.

It was for this reason and because of the absence of any systematic study of the factors causing skin striations that I undertook a careful analysis of sixty primiparæ in my service at the St. Louis City Hospital during the past winter. I found that of this number 13 women or 21.6 per cent were entirely free of any evidence of skin striations. This is a considerably higher percentage than any of the foreign obstetricians report. Fayé found 31 out of 514 women free of striations; Crede, 10 per cent; Hecker, 6.6 per cent. If larger statistics corroborate these results it would indicate that the American woman, through her better personal hygiene, and through the reform made in the shape and wearing of corsets, is less subject to skin striations than the women abroad. While I have not as yet been able to gather statistics in sufficient number among women of the better classes, I have the distinct impression that skin striations are less numerous among them than among the working classes.

Among the 47 women out of 60 cases studied who showed striations, the distribution was as follows:

Striæ upon breast only	1
Striæ upon thigh	2
Striæ upon abdomen	8
Striæ upon breast and abdomen	6
Striæ upon breast and thigh	8
Striæ upon abdomen and thigh	9
Striæ upon breast, abdomen and thigh	13

In general, therefore, it can be said that when striations do occur they are more often found at several points on the body. The abdomen is the most frequent site. The totals are as follows:

Abdominal striæ	35 times, or 58%
Thigh or buttock striæ	32 times, or 53%
Breast striæ	29 times, or 48%
No striæ	13 times, or 21.6%

[1]Read before the American Gynecological Society, Washington, D. C., May 6, 1913.

Fig. 1. Breast striations in a primipara sixteen years old, with marked increase in size of breasts.

As to the direction, size and exact location of these striations, my own investigations correspond with those of others. In my record of each case, I made a rough sketch of the location of the striæ. With some exceptions it could be said that upon the breast the striations were usually found more pronounced in the lower and inner quadrant. They were usually short and delicate and in a line radial to the circumference of the breast. Upon the abdomen they appeared at first above or slightly lateral to the mons veneris, then running obliquely almost parellel to Poupart's ligament to a point half way between umbilicus and anterior superior iliac spine and in the more pronounced cases from here encircling the umbilicus, leaving an area below this point free of any breaks. Abdominal striations are larger, varying from ½ to 2 inches in length, and from ¼ to ½ inch in width. In one instance, I found a striation 1¼ inches wide. Upon the thighs, the striæ usually run parallel to the Sartorius muscle, and upon the buttocks though somewhat irregular they usually run a vertical path.

The histopathology of skin striations has been carefully studied by Langer, Unna, and others who showed that the break was in the cutis itself. The subepidermal elastic fibers are torn apart so that beneath the striation itself only a very few interlacing elastic fibers can be seen, while at the edges of the striation the torn, retracted, elastic fibers are found in bundles. The epidermis receives the full strain of the growing abdominal contents and is put upon the stretch, causing an obliteration of the papillary layer, and a thinning of the epithelium itself. Hence the color of the blood in the capillaries shows through at these points. The interference with the normal blood supply of this region leads not infrequently to œdema of the striated skin. We very rarely find subepidermal hæmorrhages.

The majority of the 60 women examined could give very little definite information as to the time of appearance of the first striæ. In 17 women from whom a definite answer could be obtained, the majority first noticed striations either upon the breast or in the hypogastric region about the sixth or seventh month of pregnancy; but sometimes as early as the fifth month.

Some writers have stated that skin striations are seen comparatively rarely among

Fig. 2. Abdominal and thigh striations in same patient as shown in Fig. 1, a primipara of sixteen years.

savage races, due probably to their practice of lubricating the skin with oil, and to the better hygiene of the skin where clothing is absent. How reliable these statements may be, I have no means of verifying. While about one third of my 60 patients were negresses, I did not feel that the number was sufficient for a comparative study. It should also be remembered that striations are much less noticeable upon the skin of blacks than upon the skin of whites.

Barfurth pointed out the definite relationship between the age of the parturient and the frequency of skin striation. He explains this very plausibly on the ground that the skin of young girls is under considerable strain to keep up with the normal body growth, and that when in addition thereto there occurs the stretching due to the pregnant uterus and the development of the breasts, skin striations are almost certain to result. My figures were in entire conformity with Barfurth's. Out of 44 girls under 20 years of age, only 6 or 13 per cent had no striations, and 17 or 38 per cent had marked striations, while of the 16 women over 20 years of age, 7 or 44 per cent had no striations, and only 1 or 6 per cent had marked striations.

Fig. 3. Abdominal striations in a 19-year-old primigravida with rapid increase in weight. Did not wear corset for several months.

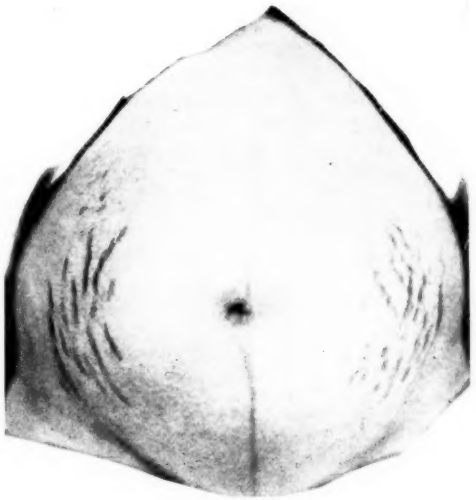

Fig. 4. Marked abdominal striations in a II-gravida with unusually large child and fatty abdominal walls.

The obesity of the pregnant woman is also to some degree a factor in the formation of striæ. Grouping the women into those over 130 pounds in weight and those under 130 pounds, the heavier women show 9 cases of marked striation, and only 1 without striation, whereas the lighter women, those under 130 pounds, showed only 3 cases of marked striations, and 3 women without striations.

More important than the weight of the individual is the *increase in weight during pregnancy*. Here we find, particularly in breast and thigh striations, a very striking relationship to the increased deposit of fat in the skin.

FACTORS IN THE FORMATION OF BREAST STRIATION

A comparison of the 29 women in whom breast striæ were present with the 31 women in whom they were absent leads to interesting conclusions. The women with striations stated in 21 of the 29 cases that there had been a more than normal increase in the size of the breasts during pregnancy. In 7 of the 9 women in whom the breast striations were very marked there was a history of a very decided increase in the size of the breasts.

Contrast this with the other group: In 21 of the 31 women without striation, there was also no increase in the size of the breasts above the normal, in 8 of the remaining only a slight increase above the normal, and only in two instances a very pronounced growth of the breast. One of these two last named women had employed vaseline massage regularly throughout the last month of pregnancy, which may in this case account for the absence of striations in spite of the greatly increased size of the breast.

FACTORS IN THE FORMATION OF THIGH STRIATION

Increased deposit of fat is also to some extent a factor in the formation of striæ upon the lower limbs. In all the women with marked thigh striations there was a history of a considerable increase in weight. More striking, however, was the influence of age. The rapid growth of the skeleton alone is sufficient in many young girls to bring about striations upon the hip. If, in addition, such girls become pregnant such striations are more pronounced. In fact, they are only rarely absent. In my series there occurred only 1 case of hip striation in a woman over 20 years of age.

FACTORS IN CAUSATION IN ABDOMINAL STRIATION

Many factors come into play in the etiology of striæ upon the abdomen. Age and increase in weight must be considered. Unusual size of the pregnant uterus, due to a large child, twins, or hydramnios, is an important factor. Of special interest is the influence of the corset. None of the women in my series wore binders. Six of them also wore no corsets at any time during pregnancy. The remainder wore corsets for varying periods of time from one month to the full nine months of gestation. In spite of the other factors coming into play, the influence of the corset could be definitely seen by the fact that the women with no striæ averaged six months wearing a corset, the women with slight abdominal striæ, averaged 5.1 months wearing corset, and the women with marked abdominal striæ averaged 4.9 months wearing a corset. Thus the longer a corset is worn, the less was the tendency to skin striations. This point came out even more strongly when only the women who wore a corset for 8 or 9 months were considered. The 16 women in this group showed no striations 9 times, very slight markings 6 times, and only once decided striæ. This woman with decided striæ was very stout, had increased greatly in weight, and gave birth to a 10-pound baby, sufficient reasons for striæ formation in spite of all measures to the contrary. The most pronounced abdominal striations occurred in those women who entered the maternity wards about the sixth and seventh months and were compelled to remain without corsets until delivery. I have advised the making of inelastic abdominal binders for these women.

RELATIONSHIP TO ABDOMINAL RELAXATION

Special attention was paid to the condition of the abdominal walls after delivery. Relaxation of the abdominal walls might be said to be either the cause or the result of the striæ, or it might be said that the same causes produce both relaxation and striation. The last named interpretation seems the most plausible but I cannot get away from the idea that the abdominal muscles must undergo a certain amount of pressure atrophy when they are caught as in a vise between a tense, inelastic skin and an enlarging abdomen. In other words, skin elasticity gives a better opportunity for muscle nutrition and muscle exercise. Whatever be the correct interpretation, the study of my 60 cases showed a very definite relationship between marked striation and marked relaxation. Thirty-four of the 60 women in my series had strong abdominal walls postpartum, and only two of these showed marked abdominal striæ formation. None of the 13 women who had no striation showed any abdominal relaxation. On the other hand, out of 10 women whose walls were greatly relaxed, none were free of striation, and 9 showed marked striation.

It was interesting also to note the relationship between striation and perineal tears. Wallich, in his textbook, "Elements d'Ob-

stetrique," states definitely that skin striation indicates poor tissue, and that perineal tears are more apt to occur in such women. He cites no evidence of his own or others in support of this statement. In the 44 women of my series from whom accurate data were obtained on this point, there were 14 with no perineal laceration, 15 with slight laceration and 15 with severe laceration. In these three groups there was practically no difference in the percentage of skin striation. We must therefore conclude, as far as these figures go, that no relationship exists between perineal tears and striation. Possibly a long series delivered by one man under similar conditions with the elimination of very large or very small children, and abnormal presentations, might establish some relationship between tears and striations.

TREATMENT

The custom of certain nations, such as the Japanese and the tribes in the Malay Archipelago, of massaging the abdomen of pregnant women to facilitate labor, has to some extent been held accountable for the absence of striation in these races. In this country, particularly among the negroes, it is not at all uncommon to find vaseline or some oily or greasy substance used as a lubricant to improve the condition of the skin. You are doubtless all familiar with the well-advertised and expensive liquid called "Mother's Friend," which I understand is merely cottonseed oil with the addition of a few aromatic oils. It is supposed to guarantee an easy labor and a smooth skin. Apparently such procedures really do decrease the tendency to striation. In 8 cases in my series in which vaseline, alcohol, mutton suet, "Mother's Friend," or glycerine was employed for a period of from one to four months, only two women showed more than the slightest lesions in the skin, and these two were premature mothers, one a girl of 14 and the other a girl of 15. Stratz, in his book on "Koerperpflege der Frau," emphasizes the importance of skin massage. He advises daily lukewarm baths, followed by about 15 minutes' massage of the skin over abdomen and thighs. This should be done preferably by a masseuse with the patient in the recumbent posture and the knees flexed. Stratz opposed the wearing of a corset during pregnancy, but it should be remembered that the corset Stratz refers to was a very different apparatus from the present one. He doubtless would be inclined to modify his statements in accordance with the present style.

Stratz gives no figures, comparative or otherwise, as to the results of such skin massage upon the formation of striæ. Barfurth, on the other hand, has recently reported 10 cases in which such manipulations of the skin were regularly employed during pregnancy, and skin striations were thereby practically entirely avoided.

My own experience thus far would tend to corroborate the above. Beside the 8 hospital patients in whom as already stated lubricants were employed irregularly but with considerable success, I can also speak of 6 private patients, all primiparæ, who carried out instructions as to skin massage faithfully during the last three or four months of pregnancy, and in whom not a single case of skin striation developed.

I usually give the following instructions to my patients: After a warm tub bath, moisten the finger tips in glycerine, pick up the skin in folds and rub it gently to and fro. Particular attention should be paid to the lower abdominal quadrants running from Poupart's ligament to the umbilicus. Over the hips and the breasts a similar light skin massage should be employed, the whole procedure lasting about 15 minutes every day. It is important that no deep pressure is exerted in this massage. The only reason for using glycerine in massaging the skin is that a lubricant makes the procedure less irritating, and that glycerine is a clean and inexpensive lubricant. The use of oils for the purpose of increasing skin elasticity is not supported by dermatologists. The effect of such skin massage in improving the hygiene of the skin cannot fairly be doubted. The painful, tense feeling in the abdominal walls particularly is greatly relieved. Personally I am of the opinion that the deeper structures also, particularly the abdominal muscles, are thereby put in better condition.

SUMMARY

Only 13 out of 60 primiparæ were free of skin striations.

Skin striations occur most frequently at several points and usually make their first appearance about the sixth or seventh month of gestation.

In girls under 20 years of age they are decidedly more pronounced and more frequently found than in older women.

Obesity, particularly rapid increase in weight during pregnancy, predisposes to the formation of striæ, especially those about the breast and thighs.

Lack of abdominal support during pregnancy, as in those who wear no corset, favors the formation of abdominal striæ

On the other hand, the tense and inelastic skin in which such striæ are found is to some extent a factor in subsequent abdominal relaxation. At any rate, abdominal muscular relaxation and abdominal skin striation go hand in hand.

Perineal tears have apparently no relationship to skin striation.

Finally, the persistent employment of proper skin massage will, in the great majority of cases, prevent the formation of any but the slightest skin striations.

The photographs illustrating the different forms of skin striations were of patients in the Washington University Maternity, and I am indebted to Dr. Henry Schwarz for permission to use them.

VENTRAL TUMORS OF THE SACRUM[1]

By ARTHUR AYER LAW, M. D., Minneapolis
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EMBRYOLOGY gives us the key to a proper understanding of sacrococcygeal tumors — those growths ventral to the sacrum, or the post-rectal tumors, so called. This region is prone to tumors of a different type than those usually found elsewhere, viz.: dermoid cysts, teratomata and mixed tumors. The common tumors of otherwise wide distribution are rare here; we will therefore limit our study to the above mentioned tumors peculiar to this locality.

Consideration of the caudal end of the spinal axis in greater detail clears up some of the haziness which has in the past surrounded our understanding of these growths. When, early in embryonic life, the entoderm forms the caudal intestine, the canal dorsalis and chorda dorsalis; the mesoderm the connective tissue, muscles, vertebræ and blood-vessels; and the ectoderm the primitive streak, medullary tube and its vestiges, the central canal of the spinal cord and the primitive alimentary canal are continuous around the caudal extremity of the notochord. This passage, which brings the developing gut and cord into communication, is called the neurenteric canal.

When the proctodeum invaginates to form part of the cloacal chamber, it meets the gut at a point in front of and some distance above the place where the neurenteric canal has its opening into it; therefore there remains, for a period, a part of the gut down behind the anus, called the post-anal gut. This is later obliterated, as is the neurenteric canal.

Considering the complexity of the embryonic tissues forming the caudal section of the trunk axis and their perfect evolution ere they arrive at maturity, we can understand how many and varied deviations from the normal are possible; indeed, the marvel is how we so frequently escape the pathological forms.

We know the simpler dermoids are most frequently situated in the lines where, during embryonic life, coalescence takes place between cutaneous surfaces. These are des-

[1] Read before the Western Surgical Association, Cincinnati, Ohio, December 21, 1912.

ignated "sequestration dermoids." A rarer type arises in what are called obsolete canals, and these are called "tubulo-dermoids." Tumors belonging to this genus are found only on the head, neck and trunk.

The more complex tumors, the teratomata or the mixed tumors, are reported in the sacral region, in the brain, bladder, ovary, testicle, thorax, and peritoneum. Ekehorn collected 31 cases of mediastinal dermoids, many of which showed the three fœtal layers once believed to be necessary in the true teratomatous growths. These reports refute Wilm's original assertion that true teratomata could be found only in the ovary and testicle. He erroneously placed them in a class by themselves.

The Marchand-Bonnet theory, which accords a genetic equality to all composite dermoids, embryons, and parasites, is still generally accepted. Borst, in commenting on the ventral tumors of the sacrococcygeal region, says, "As we sometimes have such great disturbances in this region, possibly in stunted conditions of the lower end of the axis skeleton, portions of the vestiges coccygiens may be transplanted to the ventral side and give rise to tumors."

Middledorpf was the first observer to clearly associate these congenital tumors with the post-anal gut. Fœtal rests from the obliterated bowel form the nidus for the growths.

The literature is rich in various theories as to the cause of these tumors. Much is, as yet, speculation as to their etiology, yet pathologists and embryologists are generally agreed that teratomata may arise from local disturbances of development of misplaced tissue anlage, known as monogerminal tissue implantation.

The simpler dermoids, with their sebaceous material, hair, skin, sweat glands, teeth, etc., are apparently due to the simpler inclusions of the ectoderm. The teratomata, however, generally show evidences of all three fœtal layers, as may the mixed tumors. Middledorpf, Ritsch, and Masse believe the tumors under discussion are due to proliferation of the remnants of the medullary canal, neurenteric canal and hind gut, in association with ectodermal and mesodermal inclusions.

Virchow, Ahlfeld and Henning find it difficult to explain by the monogerminal theory some of the more complex teratomata, where an entire limb, an eye, a bronchus, vertebræ, or rudiments of intestine or liver may be demonstrated. These evidences have given birth to the bigerminal theory, which is that such a tumor represents an incomplete monstrosity or twin, a parasite engrafted upon its autosite or host, the belief being that the existent fœtus in its early career included the products of a fecundated ovum — a suppressed fœtus, so called. Gross and microscopical evidence gives support to both of these theories.

The theory that these neoplasms are derived from a blastomere or impregnated pole

Fig. 1. Section of large tumor, showing alternating areas of hæmorrhage and necrosis, with one focus of calcification.

cell which at an early age has been cast out of the complex will explain the presence of the three necessary embryonic layers. This theory also has its advocates, but it is not generally accepted.

The hairy polyp of the throat and mouth cavities and the solid teratomata at the base of the skull may be explained by inclusions of ectoderm anlage. The teratoids of the vagina and cervix are probably due to inclusions of myotome or malformations of the Wolffian duct. Wilms believes those of the kidney due to proliferation of the remains of the Wolffian body.

The sacrococcygeal tumors of this group vary as greatly, individually and morphologically, as do the dermoids and teratoids elsewhere. They present a great diversity of tissue. From the simple dermoid structures they may present cysts containing or lined with ciliated, flat or columnar epithelium, fibrillar connective tissue, muscle fiber, hair, teeth, nerve tissue, glands, skin, intestinal remnants, bone, and cartilage — rudimentary or special organs. Such growth Rindfleisch names "histological potpourri." Masse states that ventral sacral tumors are generally cystic; other observers, however, report enough solid tumors to cause an appreciable percentage of the whole.

A preponderance of one tissue may appear; e. g., when ganglionic cells or neuroglia are present, the tumor is presumably derived from the neurenteric canal or the filum terminale, the so-called neuro-epitheliomata of the older writers.

True dermoid cysts may be found forming a part of the more complex mass, or next to tumors of mixed construction. Transitional forms of tumors are recorded: from the simple congenital cysts to the larger and more complex dermoids, monogerminal in origin; from these on to the simpler mixed or teratoid tumors; from these, again, to the elaborately complex masses due to a bigerminal implantation, or true fœtal parasites.

Practically all of these tumors are definitely encapsulated and arise usually from the

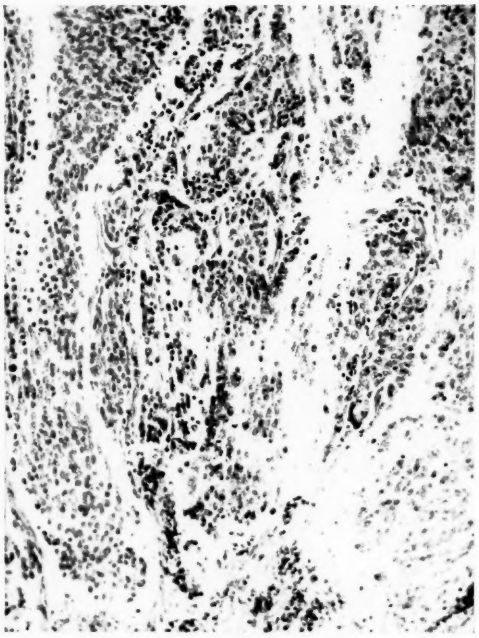

Fig. 2. Area in large tumor showing diffuse infiltration of embryonic cells.

pelvic connective tissue or have a slight attachment to the sacral periosteum. They are seldom attached to bone, as are the majority of the dorsal sacral tumors; and our theories of their mode of origin offer a logical explanation for this.

Many of these tumors are not demonstrable save by vaginal or rectal examination; others may cause bulging of the perineal or coccygeal region: again, large tumor masses may spring from a pedicle near the anterior sacral region and hang down from the body as a sacral appendage. Brennan and Choquette, Phillips, Pringle and Davis report such cases. The growths nearer the skin are more often simple dermoids, while those higher in the pelvis are more complex and are much more rare.

These neoplasms are reported as rupturing into the vagina, bladder, or rectum, discharging their contents or pus into these adjacent organs. One case, reported by Keene and Coplin, opened spontaneously between the sacrum and coccyx — others are reported as rupturing through the perineum.

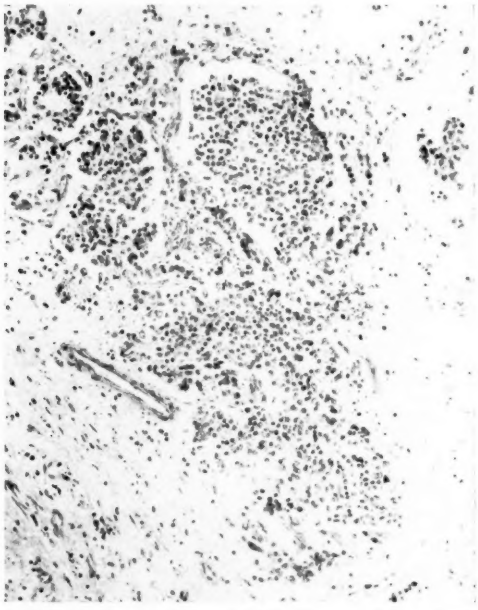

Fig. 3. Area in large tumor showing nests of embryonic cells.

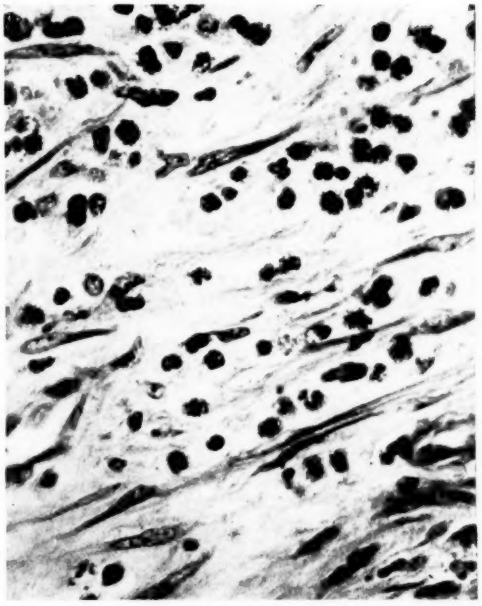

Fig. 4. Area in large tumor showing stroma infiltrated by eosinophiles.

They may simulate uterine fibroids, ovarian cysts, intraligamentous cysts, or anterior spina bifida with meningocele, and generally give rise to symptoms from pressure on neighboring structures. These tumors have long been considered benign, but the cases of metastasis and local recurrence following removal recorded by Pringle and Tescher are significant.

Murphy calls our attention to the fact that they often contain mammary and testicular tissue which is liable to undergo malignant change; and the reported, but very rare, chorio-epitheliomata in teratoids warrants the assumption that malignant transformation is not unusual. They are therefore on the border line of malignancy and should be removed.

Reports of these tumors coincident with pregnancy are difficult to find. Bernacki reported a dermoid cyst which interfered with labor, while Skulsch refers to another dermoid cyst which he emptied through a perineal incision prior to labor.

Exostoses of the other pelvic bones inter-

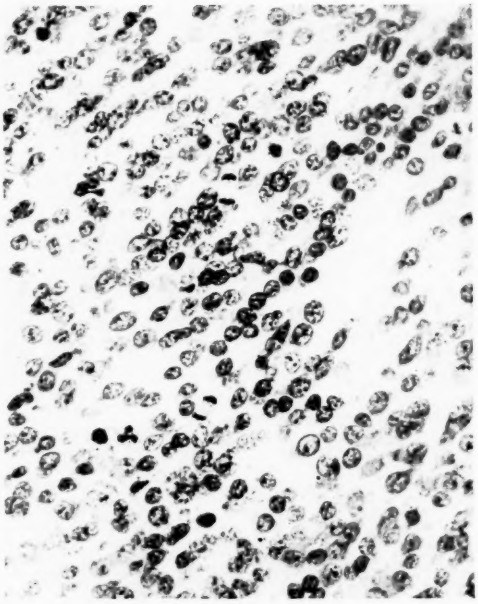

Fig. 5. High-power view of embryonic cells in large tumor. Note mitoses and variations in size of nuclei.

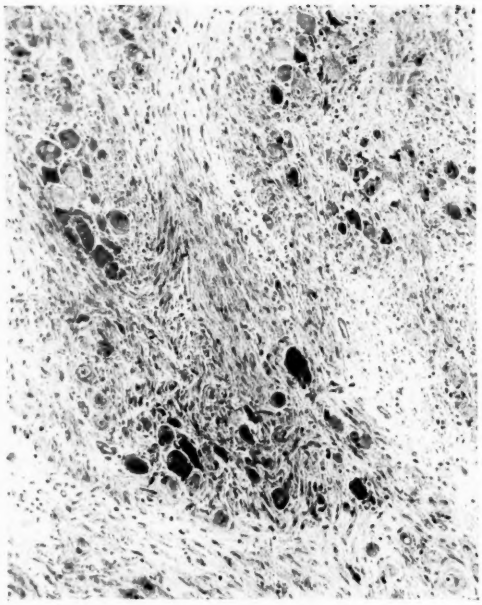

Fig. 6. Low-power view of small tumor, showing trabeculæ with collections of ganglion-like cells.

fering with labor are reported, and Bland-Sutton describes a large chondroma of the sacrum which prevented labor. In a careful perusal of the literature the writer can find no case like the following one, which prompted this paper.

Miss M. B., aged 16, was pregnant and at full term. She had been in active labor for 24 hours when I was called by the obstetrician, Dr. A. B. Cates, of Minneapolis. There had been no engagement of the child's head nor could it be made to engage. Bimanual examination revealed the soft anterior lip of the cervix, while the pelvis was filled by a hard, fixed, tense, non-elastic mass which we believed to be a fibroid in the posterior cervical lip. This growth absolutely precluded delivery per vaginam, so Cæsarean section was done after the method advocated by Kelly, where the uterus is delivered through the abdominal wound prior to its being opened.

We find this procedure permits of an assistant grasping the uterine blood-vessels on either side, and absolutely controls hæmorrhage when the uterus is opened. The child and placenta were removed, and, finding manipulation back of the uterus could not dislodge the tumor, which was firmly fixed, we decided upon a panhysterectomy. It was only after this operation was started, the broad ligaments ligated and cut, and the anterior vaginal fornix opened, that we were able to feel the attenuated thinned posterior lip of the cervix. Then, and then only, were we able to recognize the tumor as a pelvic tumor, crowding close to and attached to the vagina and rectum. It could not have been removed by the abdominal route, so the hysterectomy was finished. The girl made a normal recovery and her child lived.

The initial operation was done August 28, 1912, and on October 2, 1912, the removal of her tumor was undertaken, as we feared from its clinical aspect it might be sarcoma. Her hæmoglobin was 60; she looked cachectic and the tumor was growing rapidly. She was placed on her face in the reverse lithotomy position and an incision was made from the upper part of the sacrum in the midline nearly down to the anus. The sacrum was chiseled across just below the second foramen at the level of the sacrosciatic notch and removed, and with it the coccyx. A typical Mayo-Kraske exposure was done. The tumor had but a small attachment, 1 inch across, to the sacral periosteum, and was shelled out of the pelvis without much difficulty and with practically no hæmorrhage. Some care was necessary to remove the attached vagina and rectum. Again the girl made a normal recovery, and was discharged from the hospital November 10.

Dr. H. E. Robertson, associate professor of pathology and bacteriology in the University

of Minnesota, reports upon this tumor as follows:

Pathological description. Specimen consists of an oval mass measuring 9 cm. in length and 6 cm. in diameter, surrounded except at pedicle by a dense fibrous capsule. The external surface is irregularly lobulated and mottled by dusky red areas showing through the capsule, which areas have a softer consistence than the whitish portions.

Cut surface shows the mass composed of distinct lobules of varying size. Some of these are distinctly hæmorrhagic, the hæmorrhage almost obscuring the grayish pulp. Other lobules are dense white in color and often show a yellowish capsule or even have a yellowish tinge throughout. Small foci of calcification are present in these latter areas. Dense connective tissue trabeculæ are plainly in evidence. Accompanying the main tumor is a smaller oval, very firm, grayish white mass about 3.5 cm. in diameter. It sections with resistance of fibrous tissue, and its cut surface is smooth but marked by interlacing fibrous-like bands between homogeneous areas.

Microscopical description. Tissue fixed in Zenker and stained with Mallory's eosin methylene blue. Sections of the main tumor show many areas containing masses of embryon-like cells, showing vesicular nuclei, no definite cytoplasm, but with varying amounts of finely granular eosin-staining intercellular substance. In some cases the nuclei are closely packed together and in others more widely separated. No alveolar or other characteristic manner of grouping can be demonstrated. Many of them vary in size and intensity of staining properties, and mitotic figures are fairly numerous. These masses are surrounded by a loose connective tissue reticulum which in some places separates the cell-groups into distinct isolated areas with a large amount of intervening fibrillar tissue, while in other locations only delicate fine capillary-bearing strands are between the lobule-like collections of cells. In a few places the cells diffusely infiltrate the stroma. Hæmorrhage into the stroma and cell nests is irregularly distributed. The stroma shows long spindle-shaped cells with occasional elongated bipolar filament-like processes of

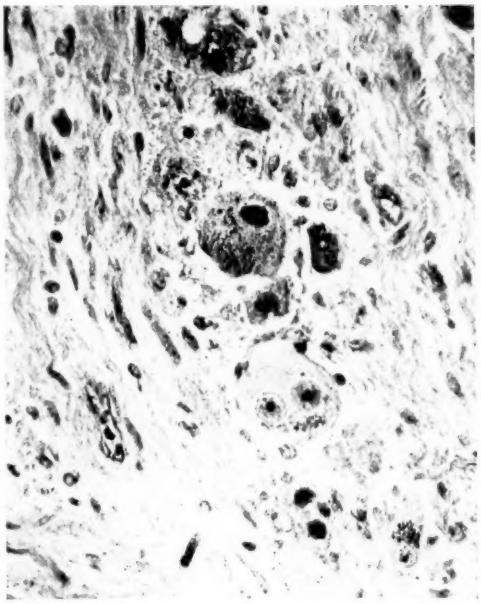

Fig. 7. High-power view of ganglion-like cells in small tumor. Note pigment and double nuclei.

basic-staining cytoplasm. A few are definitely multipolar. Capillaries are very numerous and thin walled. Between these cells of the stroma there is a large amount of homogeneous eosin-staining substance in which a few fibrils are visible. Where the blood-vessels are most numerous, the tissue is infiltrated by large numbers of eosinophilic polymorphonuclear leucocytes, and these leucocytes are also in excess in the blood-channels. Large areas of necrosis are common and a few foci of calcification are prominent.

Sections of the smaller mass show the tissue composed of dense fibrillar trabeculæ of various sizes, running in all directions and separated by a loose œdematous stroma. In the larger of these trabeculæ are many large swollen rounded or oval cells, showing eccentrically placed nuclei with distinct nucleoli and eosin-staining cytoplasm. Some of these contain granules of golden yellow pigment, and occasional rounded hyaline bodies are present. A few contain double nuclei and others show various stages of degeneration

and cell death. Although no processes can be demonstrated, their morphological resemblance to nerve ganglion cells is striking.

Conclusions. The large tumor shows a loose, rapidly growing connective tissue stroma in which are nests of embryonic cells growing in syncytial-like masses and suggesting malignancy in their manner of growth and appearance. Areas of hæmorrhage, necrosis, and calcareous degeneration demonstrate the atypical character of the tissue, its rapid development and imperfect blood supply.

The smaller tumor suggests a neuroma in its general character, although neuroglia fibrils have not been demonstrated.

That the tumor springs from some misplaced remnants of the terminal portions of the neural tube seems a logical conclusion. That portions of it have developed abnormal powers of proliferation and shown signs of malignant change, while other portions have in an imperfect manner reproduced the adult type of nerve tissue, is apparently the only explanation which accounts for these rather widely diversified tumor masses.

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INTRA-UTERINE FRACTURE[1]

REPORT OF A CASE AND A REVIEW OF THE LITERATURE

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ON November 22, 1912, Mrs. D., aged 20, was delivered at term of her first child. It was a breech presentation and when delivery was nearly completed, Dr. George L. Bond, of Alto, who was in attendance, brought down the feet. This was easily accomplished and he was astonished to find on delivery of the second (right) foot, that the leg was deformed. His first thought was that in spite of his great care he had in some way fractured it, but on attempting to correct the deformity he found it impossible to do so.

The child, a girl, was brought to Grand Rapids the next day. There was a sharp bend of the right leg at about the junction of the middle and lower thirds, flexing the lower end of the leg and foot forward and tilting the latter slightly outward (Fig. 1). The fracture resisted all ordinary attempts to reduce it and was evidently firmly united. The right foot appeared slightly smaller than the normal left one, and, allowing for the angle, the right leg appeared slightly shorter than the left. The infant in other respects was apparently perfectly healthy.

Both the father and the mother appeared to be perfectly healthy people. They denied any venereal or other disease, and the family history was negative.

On inquiry as to any injury to the mother during pregnancy, I was told that two months before confinement, while she was walking on a porch, a plank gave way and her right leg and thigh went through a hole so that her body was slightly jammed. The board had to be sawed away before she could be extricated. This, however, resulted in only temporary bruising and she was up the next day. Two weeks before confinement she fell on the ice but did not suffer any ill effects.

Because of its age and the advantage to be derived

[1]Read before the Chicago Gynecological Society, March 21, 1913. See discussion p. 390.

from breast feeding, the child was sent home and further examination and operation were deferred for two weeks, when the mother and child entered the hospital.

The photograph was taken and an X-ray examination made eighteen days after birth, at which time I found the leg in practically the same condition as when it was first observed. The line of fracture in the tibia is easily seen in the X-ray plate (Fig. 2). The slight arrest of growth is interesting. The foot is slightly smaller than its fellow and the tibia is apparently just about a centimeter shorter. Some of the centers of ossification just appearing in the left foot have not appeared in the right.

On December 11, under ether anæsthesia, some considerable force was used in an attempt to break the bones. This failing, an incision was made, first over the tibia and then over the fibula, and they were attacked directly with a chisel. The lines of union were easily found — both bones were slightly overlapped. The ends were divided. The bones and soft parts were, of course, very delicate and care had to be taken not to do injury. No attempt was made to wire. The small incisions were closed with catgut and a plaster bandage applied.

Some little swelling followed the operation, necessitating the division of the plaster bandage. As the swelling in the parts diminished, this evidently allowed just enough motion within the bandage to produce a small amount of deformity. The foot tilted outward a little.

On January 27, 1913, the tibia and fibula were again exposed along the route of former operation. The ends were in good apposition, but slightly angulated. There was very little callus at the point of union and the ends could be easily divided with a knife. Both ends were again completely severed. The free edges of the periosteum of the tibia were sutured with chromacized catgut, although it was impossible to do this with the fibula. A posterior lateral splint was applied, beginning well above the knee, around and over the dorsum of the foot. In spite of the vigorous kicking of the child it held well. The result is seen in Figs. 3 and 4. The slight shortening of the right leg and foot does not seem to have increased any, but it is apparent.

This is plainly a case of intra-uterine fracture of the purest type, of which there have been comparatively few cases reported in the literature.

We may divide intra-uterine fracture into several different groups. First, those which take place during delivery — intrapartum fractures. The head is the most common point of injury, although fractures of the femur, the humerus and clavicle are not infrequently met with. Most of these fractures but not all take place during artificial delivery. I have not attempted to go to any extent into the literature of such obstetrical injuries, but I would refer those interested to articles by Lewis (1), Jardine (2) and Parvin (3).

In a second group we may place those fractures which have as a predisposing cause certain diseases of the bone. According to Nathan (4), all cases of bone disease in the fœtus are either those associated with other constitutional anomalies or may be grouped as cases of chondrodystrophia and osteogenesis imperfecta. He denies the existence of fœtal rickets, although this point is disputed by some. In both these groups the appearance of the child at birth is so peculiar as to leave no doubt with the observer that he is dealing with an abnormal individual.

According to Nathan (5), (whom I freely quote), the external appearance of a chondrodystrophic fœtus is practically pathognomonic. The head is very large and appears still larger in contrast with the deficient length of the fœtus as a whole. Both the upper and lower extremities are too short. The arms do not reach the waist-line, and the lower limbs are so short that decentralization of the body is produced, the midpoint falling in the neighborhood of the xiphoid cartilage instead of at the navel as is normal. The extremities are bent and deformed, and occasionally fractured. All the epiphyses appear more or less enlarged, and those of the ribs produce the so-called rachitic rosary. The skin and subdermal tissues are hypertrophied, causing an exaggeration of the skin folds; the abdomen is prominent and the fœtus as a whole appears very obese. Frequently the lips, eyelids and tongue are thickened, the latter protruding from the mouth. The distinguishing characteristic is the decided prognathus, with marked retraction of the nose and in some cases the flattening of the whole nasal region. This condition has been described as congenital cretinism. The changes of cretinism, however, always occur, according to Kaufman (6), after birth, although a predisposition may exist at the time the child is born.

Osteogenesis imperfecta (I quote Nathan again) is a systemic bone disease which attacks the very young fœtus and, without

Fig. 1.

Fig. 2.

causing any other appreciable abnormalities, prevents or disturbs the normal development and calcification of the osteoid tissue. This process is confined to the shafts of the bone; the epiphyseal cartilages are normal as to size and consistency. Externally the disease manifests itself by defective development of the cranial vault and fragility of bones of the entire skeleton. The general appearance of the new-born fœtus with osteogenesis imperfecta is peculiar. It resembles somewhat the chondrodystrophic individual, but this is confined only to the thickened skin and subcutaneous tissue, which gives these individuals an obese or œdematous appearance. These tissues, however, are not nearly so uniformly affected as in chondrodystrophia, for there are many cases in which the skin is perfectly normal. In osteogenesis imperfecta the extremities are not shortened; at any rate, not as a result of cessation or retardation of growth. They are often much bent and deformed and are always so brittle that the slightest violence results in fracture. Not infrequently there are intra-uterine fractures. They may be recent and present the usual signs of fracture or they may be firmly united and only evidenced by the abundant callus present. The latter may be so numerous that they give the bone a peculiar appearance. The intra-uterine fractures may cause much deformity, but they unite firmly as a rule and pseud-arthrosis is rare. This fragility extends to all the bones of the body. The stability of the entire skeleton is more or less markedly diminished and, instead of acting as a framework for the body, it is its most delicate and fragile part. Most of these infants die during intra-uterine life. Nathan cites two cases that have come under his observation and believes that the fragilitas ossium seen later in life is identical with it.

Syphilis may produce marked changes in the osseous system and separation of the epiphyses may even occur. Where such takes place, however, other evidences of the disease are present at birth and we may know that we are not dealing with an ordinary fracture.

Another, and to us more interesting group because of its former classification as intra-uterine fractures, is that presenting certain bone deficiencies with deformity. The one that has given rise to the most confusion is that associated with absence or deficiency of the fibula, with defect of the external arch — usually absence of one or more of the toes, or the tarsal or metatarsal bones of the foot. A large number of these cases have been reported. A settlement of the question as to their origin has ruled out the majority of cases formerly cited as intra-uterine fracture. The opinion has even been expressed that real intra-uterine fracture could not take place without death to the mother, or death to the fœtus and abortion, or abortion alone — an opinion which has proved to be erroneous. Because of the frequency with which this deformity has previously been classified

Fig. 3.

as true fracture, I am taking the liberty of discussing this condition at some length.

Brinton (7) in his paper (1884) has reviewed the subject of intra-uterine fracture and in collecting the reported cases has cited a number which undoubtedly belong to this group, and some whose etiology is questionable. As a good instance of the former I report his first case in detail.

Mrs. L. T., aged 25, strong and healthy, was delivered of her first child by use of forceps, after a prolonged labor. At birth the right leg of the child was deformed. The child lived, nursed and throve. In November, 1883, was brought to me for surgical treatment.

Mother gave the following history of pregnancy: Last menstruation previous to pregnancy, April 28, 1882. On September 28, 1882, five months after, while climbing, fell about three feet. Did not strike abdomen, as in the fall she guarded it with her hand. Fall produced bruise, no shock. No bleeding at time.

Three days after the accident she quickened. About two or three weeks after the first fall she fell again, this time down stairs, falling about twelve feet, coming on hands and knees. Did not know how she struck herself, as she was unconscious for some time after the fall.

No bleeding from the vagina. She complained of great pain in the abdomen after the second fall, which continued up to the time of confinement and was attended by some nausea and vomiting. Movements of the child were constant and violent after the second fall. Mother stated that at birth the right leg of the child, also the foot, was shorter and smaller than the opposite.

Fig .4.

Examination. Child about nine months old. Right leg shorter than the left, somewhat flexed on the thigh, angular deformity of the tibia forward. Seemed to have been oblique fracture of tibia, junction of middle and lower thirds, overlapping of lower fragments with marked anterior projection. Upper part of fibula could be felt, but lower part was not recognized and was apparently absent. Over the most salient portion of the tibia, at point of presumable fracture, deep dimple-like depression of skin, appearance of cicatrix, and was adherent to the bone underneath. Appeared like a scar resulting from perforation of the integument by ragged end of bone similar to cicatrix of compound fracture, occurring at the same place under ordinary circumstances. Foot on this side extended on leg, contraction of the tendo Achilles, heel drawn up and tendency to valgus from the absence of the external malleolus. *Fifth toe absent, second and third toes fused for about half their length.*

From facts and examination of the tibia, conclusion was reached that from some cause or other, probably in consequence of mother's falls, fracture of the tibia had occurred, accompanied or followed by destruction of the integument. In short, that compound fracture had existed and healed at birth, with deformity.

This case typifies a large group of cases reported in the literature, the etiology of which even Brinton himself questioned. Others of the period also shared in this doubt. Little (8) as early as 1853, questioned whether these

cases were true fractures. Sperling (9) who was the first to submit the question to critical investigation, directs attention to the formation of amniotic adhesions and bands as the possible agent in the production of this deformity. Haudeck (10) collected in 1896 ninety-seven of these cases. Shiff (11) in an excellent paper on the subject concurs with Sperling. Starting with the formation of amniotic adhesions, he has evolved a theory seeking to explain the further mechanical development of the deformity found at birth. Dareste (12), whose ideas are concurred in by Nealton (13) and Kirmisson (14), has also discussed the same question and expressed the same view. Haudeck (quoted from Schiff) (11) has examined microscopically in such a case the so-called scar always found over the projecting angle of the tibia and formerly attributed to the perforation of the fragments, and has shown that it is not a scar. The evidence advanced by these men to show that these cases were not true intra-uterine fractures is conclusive, whatever may be said concerning their theories as to etiology.

A number of different theories dealing with the sequence of events leading to the bending of the tibia have been given. Fricke (15) believes that this bending corresponds with a normal period of embryonic development occurring about the fifth and sixth week, when the fibula, slower in growth, retards the tibial development and produces bending. This being true, absence or deficiency of the fibula would render permanent the tibial bend. Or, again, the deficient fibula is always replaced by a fibrous band and it is possible that the slight extensibility of that fibrous bridge, coupled with the more rapid growth of the tibia, is productive of the inward bend of the latter. Another possible factor considered by some is that in absence or defect of the fibula, there is also a corresponding defect of the muscles having their principal insertion in the defective bone, while the antagonistic muscles are firm and contracted. May not this in itself, they ask, be sufficient to produce the tibial bend?

The reason for the deficiency of the fibula, which would seem to be productive of the tibial deformity, has led to the formation of some interesting theories. It is true that the majority of medical observors until very recently have attributed it to the result of amniotic bands and adhesions. De Forest Willard (16) considers the probability of the bone deficiency being caused by blows or injuries to the mother during the first month of pregnancy. He also mentions heredity as a possible factor. Some of the French investigators, such as Boinet, have suggested the possibility that the deficiency of the fibula may be due to an evolutionary factor — a regression to the anatomical condition found in the lower animals in which the fibula not only atrophies but disappears.

The recent work of Franklin P. Mall (17) presents the subject in a different light. He has examined 434 human embryos, of which 163 or 38 per cent were pathological. He concludes that amniotic bands are not the cause of the malformation, but when found (which is infrequent) are secondary to the malformation. According to his observation, structural anomalies are of two groups: (1) those which are hereditary or germinal, and (2) those not hereditary but due to mechanical injury or disease. He considers all anatomical anomalies, and variations of the extremities as polydactyly, or some cases of arrested development, like ectrodactyly and hare-lip, as germinal and incapable of being produced experimentally. Other monsters in which more or less of the fœtus is destroyed, as in inencephaly, spina bifida, anencephaly, cyclopia, club-foot, and many variations of arrested development are not germinal but are produced in some mechanical way, interfering with the nutrition of the embryo. This he considers as usually a faulty implantation of ovum, followed by chorionic changes with resulting deficient nutrition, the whole probably arising from endometrial changes. These malformations may be considered as due to arrest of development of embryo at a certain stage in its normal development, or arrest of individual parts with continued development of the remainder. As a result of his examination, Mall finds the embryo in

a large number of tubal implantations abnormal in development.

Von Winckel (18) thinks it safe to say that fully one half the fœtuses in ectopic pregnancy are abnormal or deformed, the most common deformity being that of the hands or feet. Von Winckel has further collected eighty-seven cases, fourteen of his own, and in these he finds fifty-seven were much deformed and twelve were markedly monstrous. In only four of these were amniotic bands present. The placenta was usually deformed, sometimes multiple and often very hæmorrhagic.

Mall says that the study of ova from tubal pregnancies demonstrates conclusively that the changes in the chorion are primary and those in the embryo secondary, due to faulty implantation of the chorion.

Another argument in favor of the view he had advanced regarding the production of pathological embryos he obtained by studying those embryos in tubal pregnancies which were not destroyed at once but became well attached and grew on towards term. He found only 4 per cent of normal embryos in early unruptured tubal pregnancies. The greater number of uterine abortions in the first month he found consisted of pathological embryos. The changes in them were so radical that further development, even into monsters, would have been impossible had they not been aborted. However, it is not difficult to imagine specimens in which the changes are not so extreme, due to minor changes in the chorion, which may retard the development of a part of the embryo and afterwards become corrected, thus favoring the further growth of a distorted embryo.

The fourth group, in which my own case should be included, is that of true intra-uterine fracture, those in which the fracture of one or more bones of the fœtus has taken place previous to labor. I have found, after a careful search of the literature, forty-three such cases — my own makes forty-four, and I have included it in the statistics. Cases 1 to 32 are among those collected by Brinton, a number of which have been taken from Gurlt and quoted practically verbatim. The remainder are the only ones of true intra-uterine fracture that I have been able to find in the literature since that time.

Case 1. Mrs. D., 35 years, eight months. In the fifth month of pregnancy struck her abdomen sharply against the handle of the tub. Delivered at full term of a girl, easy labor. Lump detected over left clavicle. Saw child in consultation; recognized overlapping fracture of clavicle, abundant callus. Child now eight months old. Callus disappeared but deformity of fracture still detected.

Case 2. d'Outrepont (J. G. L. Körber). Gun shot wound. The ball traversed the belly of the mother and the head of the child. Both died.

Case 3. Löwenhardt (Zu Prenzlau). A woman seven months advanced in pregnancy, age 32, received a wound of the belly from the point of a sickle, which also penetrated the occipital bone of the child. The mother was delivered of a dead child four hours after the injury. The mother recovered and afterwards bore two children.

Case 4. Czajewski (Malaigne, J. d. Chir., December, 1846). A peasant woman, age 27, five months pregnant, accidentally punctured her abdomen with the prongs of a pitchfork. Two days afterward she gave birth to a dead child, upon whom was a deep penetrating wound at the lower angle of the scapula.

Case 5. Wagner (Plocquet). A woman was beaten and kicked at the fifth month of pregnancy. Seven weeks afterwards she gave birth to a living child. The child died in twelve days and an autopsy revealed a true fracture of the thigh bone, with overlapping ends, already united by a distinct callus.

Case 6. Sachse (Zu Parchim). A woman, age 42, a day laborer, nine times pregnant, in the tenth week of her pregnancy fell upon the ice. She fell again, eight days after quickening, from the third step of a ladder, striking a block of wood. The motion of the fœtus ceased ten days afterwards. In the seventh month she gave birth to a puny daughter, with a deformed leg. Fourteen days after birth the child was examined, when an oblique fracture of the tibia and fibula was found with external angular projection; the heel was drawn up; there was great tenderness over the point of fracture, the child crying on the slightest pressure. There was a skin cicatrix over this point, which the mother said was more drawn at time of birth. The limb was shorter than the healthy one. The hand and foot of the opposite side had respectively three fingers and toes. The reporter of the case, and Hufeland, the editor of the journal, attributed the fracture to the second fall of the mother after the middle of the pregnancy.

Case 7. Klein (Stuttgart). A peasant woman, age thirty, in the thirty-fourth week of her first pregnancy, fell into a hole in the kitchen floor, by which great pressure was brought to bear on the left side of the belly. In two or three weeks all fœtal movement ceased. She was delivered at full

term of a male child of natural size. The left foot was shortened and deformed, and in the middle of the left leg there was a fracture of the tibia, with a small watery wound. A later examination showed that the thigh bone was two thirds shorter than normal, but not broken; the tibia fractured as stated. At seven months of age the child was strong, well nurtured and muscular; the thigh bone one third shorter than its fellow; the callus over the leg was distinctly felt, and at the point of fracture a distinct scar the size of a lentil.

CASE 8. Carus (Dresden). A servant woman. In the fifth month of her first pregnancy she fell twelve or fifteen feet from a ladder, striking the lower part of the abdomen. Delivered at full term of a weakly, badly nurtured child. The right leg presented a compound separation of diaphysis from the lower epiphysis; the lower end of the shaft projected through the integumental wound, was discolored, rough and stripped of its periosteum. The edges of the wound were pale and unhealthy. The fragments were reduced, but eventually gangrene set in, and the child died on the thirteenth day.

CASE 9. Dietrich. A strong woman, aged 32, in the thirty-sixth week of her pregnancy (third) slid down stairs, striking the lower portion of her body. She was delivered sixteen days after the accident of a feeble female child who, in addition to three granulating wounds of the head, covered with healthy pus, and the edges of which were beginning to cicatrize, presented also a complete simple fracture of both bones of the forearm, which readily united under simple dressings.

CASE 10. Gremse (Helmstädt). A woman, seven months pregnant, fell through a hay shaft, striking a wagon beneath. She suffered after the accident from some pain in the head and abdomen, which passed away in two days, when she went back to work again. At full term she was delivered of a lively child, upon which were two fractures, united, with abundant callus, one of the left clavicle and the other of the left humerus. This child died after eight weeks from an unknown cause.

CASE 11. Burdach. A woman six months pregnant received a push on the lower part of the abdomen. The child, when born, presented fractures of the forearm and leg, with angular union.

CASE 12. B. F. Osiander reports two cases, one of distorted fracture above the ankle joint, and another of a child with a healed uterine fracture of the leg, with a distinct scar and callus formation. The mother could recall no history of violence. (Case questionable because of lack of detail.)

CASE 13. Guersant submitted to the Societe de Chirurgie a case of intra-uterine fracture of the middle third of the leg, with integumental wound. The mother fell in the seventh month of pregnancy. Afterwards the movements of the child were very much decreased. Resection of the projecting angle of the tibia was performed with a fatal result. (Case questionable because of lack of detail.)

CASE 14. Feist. A woman, in the eighth month of her pregnancy, fell from a ladder and struck a tub with the right side of her belly. The movements of the fœtus were at first greatly increased, but afterwards subsided. She was delivered at full term. The child had over the middle of the left clavicle a hard swelling, as of fracture united by callus, which gradually diminished, and three years later was the size of a hazelnut.

CASE 15. Velpeau. Lancette Française, 1842, December 29. Referred to by Gurlt as a case of congenital fracture of the clavicle.

CASE 16. Schmitt, W. J., Vienna. Woman, age 30, in the eighth month of her fifth pregnancy, received a severe blow. Child born at full term with fracture of the crown of the head.

CASE 17. Schnur. Woman, age 38, in the eighth month of her seventh pregnancy, in attempting to lift a tub, slipped on the floor and struck with the lower belly on the sharp edge of the tub. The child, a girl, was born at about full term, with a deep depression on the right side of the frontal bone, almost large enough to receive a thumb. The bone by degrees became gradually elevated, and at the end of three months the depression had altogether disappeared. (Possibly not fracture).

CASE 18. Wittzack observed upon a child delivered by turning for breech presentation a depression three inches long and half an inch broad upon the frontal and parietal bone. There was no suggilation or swelling on the head. The mother stated that three weeks before her confinement she had fallen from a high cherry tree, and that she had lain upon the ground for an hour, being unable to move without help on account of great pain on the right side. This pain lasted eight days and then gradually passed away.

CASE 19. Albert (Wiesentheid). A healthy peasant woman, age 20, eight days before her expected confinement, fell heavily and struck the right side of her abdomen on a boundary stone, which projected four inches from the ground. She was taken in labor, gave birth to a dead child (male), and died almost immediately from hæmorrhage, within twenty-four hours after her fall. Examination of the child showed that the left parietal bone, which was unusually well ossified, had been separated from its connections with the neighboring bones, and was greatly depressed along the sagittal suture.

CASE 20. Heyfelder. A woman in the eighth month of pregnancy violently struck her abdomen against the projecting angle of the bedstead. Movements of the child ceased, and there was bleeding from the vagina. Forceps delivery at full term; the child was born with a marked depression upon the left side of the frontal bone, in which the thumb could be placed. The child died after several days in convulsions, when the fracture of the bone was shown by dissection.

CASE 21. Dr. Lewis Proudfoot. N. Y. J. M., September, 1846. Quoted by Hamilton, 1880, p.

31. Compound fracture in utero. Mrs. F., aged 38. Abdomen pressed upon in passing through a narrow passage, in the sixth month of pregnancy. Female child born at full term. Labor natural. Right foot of child showed equino-valgus. Tibia of same limb seemed to have had a compound fracture at the middle, union slightly salient anteriorly. Cicatrix on skin over point of fracture. Seventeen months after birth child was seen by Drs. Proudfoot, Isaacs and Van Burne. Contraction of the tendo Achilles, on dividing which the limb was found to be of the same length as the other.

CASE 22. Aristride Rodrique, of Hollidaysburg, Pa., Am. J. M. Sc., 1854, p. 272. Fracture and dislocation of left arm of child in utero. A woman, four months pregnant, fell on left side, striking a board and hurting herself severely. Delivered at full term of a male child. Irreducible dislocation of left humerus into the axilla, united fracture of both bones of forearm, bones passing each other, and hand at an angle of 40 degrees. At four years old humerus had grown nearly apace with the other, forearm short and deformed as at birth, size of hand same as sound side.

CASE 23. Devergie. Révue Med., 1825. Quoted by Malgaigne, Hamilton and others. A woman in the seventh month of pregnancy fell from a chair and struck her abdomen against a chair; intense pain lasting for some time. Delivered at full term; child had fracture of left clavicle, overlapping, and united by a firm callus. Died on the eighth day.

CASE 24. Schubert. Am. J. M. Sc., May, 1828, p. 233. Brodhurst, Hamilton. Twins born before term; one child had compound fracture of left thigh, with protruding bone, one inch of which was carious. The mother, six weeks before birth, heard a noise like that produced by breaking a stick, and from that moment felt pricking pains in her belly. Fracture possibly from muscular action, or from being entangled between the legs of the twin. (Hamilton.)

CASE 25. Moffat. Brodhurst. Med. Chir. Tr., 1860, p. 120. Lady in first pregnancy, five weeks before confinement, slipped on snow and fell against stile. Great pain, confined to bed for some days, ecchymosis on right abdomen. Natural labor at full term. At birth child had united fracture of lower third of right humerus, with callus; united fracture of right forearm, callus; and united fracture of right thigh.

CASE 26. Brodhurst, ibid., p. 121, saw in 1858 a young lady, aged 13, whose mother in the seventh month, falling down stairs, struck her abdomen and was much hurt. Child born three weeks afterwards. At birth right knee was swollen, and in a fortnight discharged purulent matter. When examined foot was six and one half inches from the ground, and Brodhurst believes there had been a fracture through the epiphysis, separating the inner condyle of the femur, and contraction of the hamstring muscle. View concurred in by Fergusson. Tendons divided, foot brought down and patient greatly benefited.

CASE 27. Montgomery. Quoted by Brodhurst, ibid., p. 115. A woman eight months pregnant fell from a window twenty-five feet high into a street, on her face. Her hip joint was dislocated, her hands and face cut, but the uterus was not ruptured. She was delivered that night of a dead child, which had some of its bones broken and had sustained several other injuries. She recovered perfectly.

CASES 28 and 29. Mr. John Ewens, Med. Times and Gazette, May 12th, 1860, p. 482, reports two cases of fracture of the clavicle, one noticed in an infant a week old, before whose birth the mother met with two falls during the latter part of the pregnancy; another in an elder brother, age 20, who had also been born with a fractured clavicle.

CASE 30. Gurlt. Knochenbruchen, i, p. 222. Maedar (Roda). A woman aged 33, eight weeks before expected confinement, fell from a ladder and lay insensible on the ground. Blood escaped from the vagina and afterwards bloody water, followed by long continued abdominal pains. The child was born with spontaneous amputation of the left arm, at middle of humerus, with reddish brown moist but not bleeding or purulent stump, from which the white bone projected. Cicatrization followed in a short time. The separated parts came away with the afterbirth.

CASE 31. Gurlt. ibid., p. 216. Manuel Nava. A woman in the first pregnancy, twenty days before delivery, slipped and fell on pavement. Experienced afterwards violent movements of the child, and a sensation of faintness. Rapid and easy labor; well-developed child born with fracture of the left arm just above condyles, without redness of skin or other appearances of inflammation. Plaster dressings and a perfect recovery in thirty days.

CASES 32 and 33. Dr. Gross, Surgery, 1882, ii, 67, refers to two cases of intra-uterine fracture of the clavicle produced by violence applied to the fœtus through the abdomen of the mother.

CASE 34. Atkinson (19) reports a case of a male child, born after easy labor, with a completely united fracture of the clavicle, the angle of the fracture directed upward. Some weeks before confinement the mother had received a blow on the left side from the edge of a door.

CASE 35. Hirst (20) reports a case of a pregnant woman who was thrown from her carriage two months before delivery. Her infant, otherwise healthy, had a fractured clavicle almost entirely healed, but with a large mass of callus at the site of fracture.

CASE 36. Lumley (21). Pregnant woman, within ten days of term, attempting to enter doorway, slipped and struck the left lower portion of her abdomen against the edge of the door. The movements of the child thereupon ceased, and eight days afterwards a dead fœtus was born, with a fracture of the left frontal and parietal bones of the skull.

CASE 37. Gorham (22). Records death of fœtus from violence done mother at the hands of another woman in the course of a brutal quarrel between two sisters-in-law, during which the pregnant woman, being about six months pregnant, was thrown to the ground and stamped upon. Two months later a dead fœtus was born, corresponding in development to the sixth month of pregnancy and exhibiting a fissure of both parietal bones.

CASE 38. Kirmisson (23). Congenital pseudarthrosis of left leg. Lion D., aged eight, seen October 10, 1898. Parents healthy farmers. He has never had any sickness except that for which he came for consultation.

The midwife noticed at birth that the left leg was not straight. One notices at once a marked angular deviation of the tibia, also a transverse deformity. The lower fragment of the tibia makes an open angle with the upper fragment, the concavity directed inward. The foot is turned in, the dorsum of the foot directly out. On palpation the fibula is found to be normal, but has followed the movement of the tibia. The same bending is found with the posterior concavity, the point ending in an angle a little below the angle of the tibia.

The tibia is not enlarged only around the top of the angle, where it seems a little more thickened. On pressing on the tibial fragments with movements of torsion back and forth, out and in, one can feel abnormal mobility at the top of the angle. Movements in the pseudarthrosis are very limited. Tendo Achilles retracted, femurs same length — 32 cm. Boy otherwise well formed. Second toe is a little back of the others, and between the second and third toes is part of membrane. This membrane exists, more completely formed, between the second and third toes of the other foot, at union of the first with the second phalanges, but both the bones can be felt normal and distinct.

Radiograph shows fracture of tibia at summit of angle formed by two fragments; an oblique white line indicates the presence of the pseudarthrosis, one would think from movements of fragments, and is not the consolidation of the fragments. Back of the tibia the fibula is increased in volume, compensatory hypertrophy, as it supports the pressure on the foot.

Operation. Osteotomy, subcutaneous section tendo Achilles, plaster dressing. Three months later limb in good position but union not as yet complete, slight lateral mobility, X-ray at time shows prior union of fibula but not complete of tibia. New plaster dressing applied; child beginning to walk with this; allowed to return home; report again in one month.

CASE 39. Keating (24). John H. Packard refers to a case by Beck (reference not given). Girl born with an united intra-uterine fracture of the leg. The two fragments had been joined at a right angle. Osteotomy was successfully performed at the age of ten months.

CASE 40. Hawthorne (25), Sidney E. Fractured clavicle with ossific union in utero. Full term child. Small tumor the size of a walnut in the center of the right clavicle. Hard, dense, immovable, no apparent pain on pressure. No crepitus on movement of arm and shoulder blade and no limitation of motion. Structures surrounding it were freely movable, skin over it in normal appearance. Diagnosis of fractured clavicle made, united with callus surrounding the broken ends of the bones. No history of injury to the mother during her period of pregnancy.

CASE 41. Crosland (26). A multipara pregnant to term of her fifth child. A precipitate labor and a dead female child born, the mother having been delivered in a kneeling position upon the floor before my arrival. Four days previously she had fallen down the cellar steps, striking and severely bruising her back (the sacral region). At the time of accident she felt very faint and the thought passed through her mind that her child was injured; there was no escape of either liquor amnii or of blood from the vagina. Four days later labor pains commenced and rapidly progressing labor took place as stated above.

On examination the child was found to be dead, maceration and post-mortem change having commenced to take place. On the left parietal region there seemed to be a cephalhydrocele, but on examination this proved to be a fracture, or rather separation of the left parietal and a squamous portion of the temporal bone from one another and from the rest of the skull. They were both displaced or tilted outwards and the brain was displaced in the same manner. The lower jaw was fractured on the right of the symphysis.

There was on both sides extensive orbital and subconjunctival ecchymosis. It was evident that the severe injury which had caused the death of the child was due to the head, resting in the normal position, being forcibly jammed as it were between two opposing sides of the pelvic brim, probably the sacral promontory and the pubic bones. There were no signs of sickness, so-called fœtal rickets, or defective ossification.

CASE 42. Pugliese, Vincenzo (27). Maria Adamo, 12 months old. Mother, since November, 1901, had been suffering from convulsions which, according to her description, were of an epileptic nature. Preceding this she had been always well. During this last pregnancy the convulsions recurred with greater frequency; they have diminished since birth. In one of these convulsions she fell to the floor from her bed and was picked up by one of the neighbors.

The baby is of healthy appearance, well nourished. The only anomaly is the one of the forehead. I noticed a slight projection of the skin and underlying tissues, which begins at the lower angle of the frontanelle, extending to the root of the nose a little to the left of the median line. This projection is not wider than the width of the finger. The skin

over it is of violet color, due to the venous engorgement. Passing the finger lightly over this projection we note that beginning from the root of the nose, the finger will imbed itself in a sort of groove formed by the two osseous margins which the skin bridges over. As we gradually go backwards toward the coroneal margin of the frontal bone, this groove becomes gradually narrower and it is reduced to a small fissure near the inner angle of the anterior frontanelle and a little to the left. In putting the child's face downward, or when the child coughs or cries, this cutaneous bridge becomes more apparent and the bluish color is more accentuated. This anomaly might be thought of a congenital defect, whether through defective union or through retarded ossification.

According to Hyrtl, these cranial hernias through a defective ossific union, although very rare, are more frequent among women than men. Against this, however, the fact can be brought forward that the prominence is not really in the median line as it should be if it were a cranial hernia through a defective union of the two parts of the frontal bone; but, on the contrary, decidedly to the left of the median line, from the root of the nose to the coronal suture of the frontal bone.

Putting these facts into relation with the trauma which the mother suffered during the last convulsion, we must logically think of an intra-uterine fracture of the frontal bone. On account of the age, the union of the two osseous surfaces could not take place because of the displacement of the bony fragment.

CASE 43. Heath (28). Baby four weeks old. At birth the left leg was noticed to be shorter than the right below the knee. There is a bowing forward of the leg at the junction of the middle and lower thirds, and a corresponding groove in the soft parts on the posterior aspect. The bones in the situation of their prominence can be felt to be irregular and there is free mobility between the upper and lower fragments at this point. Circulation in foot is good and there are no other deformities. Child born head first, no difficulty, and no structure was found constricting the leg.

X-ray shows a fracture of the shaft of the tibia, with a considerable area of rarified bone around it. There are similar areas of rarification about the lower extremities of the tibia and fibula.

In discussion Mr. Heath added that the child showed no stigmata of congenital syphilis. No Wassermann done as yet. Family history negative. Noticed incidentally after birth a groove in the soft parts more marked at times. No evidence of amniotic band having constricted the limb. Was averse to operative treatment. Splint applied.

Many of the reports are fragmentary and lacking in important detail, as is common in collections of this kind. I have excluded a number of doubtful ones but have included a few that were probably, though not positively, cases of true intra-uterine fracture; these have been marked as doubtful.

It is interesting to note the nature of the accident causing the intra-uterine fracture. There are in this list three cases in which it has been produced by penetrating agents (Cases 2, 3, and 4), a gunshot wound, a sickle and a pitchfork. In the first instance both the mother and the child were killed. Although in the last two instances the child was killed and abortion followed, the mother recovered—rare exceptions, perhaps, but showing that such injuries are not always fatal to the mother. In twenty-two instances the fracture was caused by falls, in ten by blows, and in one by pressure (Case 21), often without material injury to the mother. It is well to note that in many instances where children were born with deformities which we know belonged to the third group above mentioned, that a history of injury to the mother was obtained. Of the thirty-eight cases in which the result of the injury to the mother is given, two died, and the child died in eight instances, recovering in thirty.

The fracture took place, as might be expected, during the latter months of pregnancy. In one instance, however (Case 22), a dislocation of the humerus into the axilla, with fracture of both bones of the forearm, the injury occurred at the end of the fourth month.

It is interesting to note that the injury seldom interrupted the pregnancy — twenty-nine went on to term, eight did not, and in seven the result is not given.

Most of the fractures were single (32 cases). In five, however, they were multiple. This is, however, estimating the fractures of the skull and the five designated as fractures of the "leg" as single fractures. The clavicle was the bone most frequently fractured (12 cases). There were eleven of the skull, eleven of the leg (four designated simply as fractures of the leg, four as fractures of the tibia, and two as tibia and fibula), four of the

forearm, four of the humerus, three of the femur, and one of the scapula (pitchfork).

About the time that many of the cases reported as intra-uterine fractures were shown to be simply deformities it was argued that the protected position of the child made real intra-uterine fracture improbable without death to the mother and fœtus or abortion, though its possibility was admitted. Experience, however, has shown this view to be untenable. Brinton has argued this matter at length and has expressed the opinion that the child in utero is by no means so well protected as has been affirmed.

It is well for us to know that true intra-uterine fracture, though rare, may occur, and without serious injury to the mother, as in my case, in order that we may be able to distinguish it from the other fractures or deformities seen at birth. The matter has also a medico-legal aspect, as in cases where there has been violence offered to the mother previous to labor.

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COMPILATION OF THE METHODS USED AND THE RESULTS OBTAINED BY FELLOWS OF THE CHICAGO SURGICAL SOCIETY IN BRAIN SURGERY[1]

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WHEN these questions were first written out and submitted to the Fellows who originated this method of determining the sentiment of the Fellows along certain lines, they seemed fairly adequate, but after reading the answers and seeing how easy it has been to misconstrue them, and seeing from the answers how much more could be asked for in a simple form, I feel a little like offering an apology.

But we have tried to make a presentable paper as it is, and hope that it will meet with your approval, and contribute a few ideas that may later be of value.

I. WHAT METHOD OF HÆMOSTASIS HAS PROVED THE MOST SATISFACTORY IN YOUR HANDS TO PREVENT BLEEDING FROM THE SCALP?

In response to this question, there was a marked difference of opinion. About half of the Fellows answering the question use a rubber band or tourniquets, which could be held on either with sutures, tapes, or artery forceps, while another group, less in number but active in opinion, preferred artery forceps, and the third (smallest) group used an interlocking silk stitch.

The objection to the tourniquet seems to be due, first, to the difficulty of application "in the hands of men who are not constantly applying tourniquets," so that the field of operation is soiled; and, second, the hæmostasis is incomplete. In order to overcome this difficulty, one Fellow suggests a combination of the old screw tourniquet with a strong rubber band. Another Fellow uses multiple rubber bands of heavy size, which are slipped over the vault until the requisite tension is acquired.

The things novel in the artery forceps were T-shaped forceps with a recurrent jaw, so that they laid along the skull out of the way. Another suggested the use of the elastic tacking clips with mouse teeth.

From this it is evident that the ideal method is still to come.

II. WHAT METHOD DO YOU PREFER FOR OPENING THE SKULL?

The methods for opening the skull were nearly uniform, all making an osteoplastic flap. Fourteen of the Fellows use a combination of the cone chisel or trephine and connect these openings with a De Vilbiss bone-cutting forceps with a narrow toe. Three or four used a Gigli saw for this purpose. One Fellow used a Hudson bone drill of which he spoke very highly. Another used the Neff craniotome. Chisels were used by one to smooth the edges to make a resting-place for the bone flap. One Fellow entered the cranium with a gouge and proceeded from this with a De Vilbiss. Here we have the De Vilbiss forceps before us more than any other method, with the wire saw in the background, although it seems that the wire saw should be more widely considered because of less danger to the dura and the smoothness of the cut. As to the beveled edges which have been spoken of so highly, it seems that the tissue torn by the saw is so great that the flap will really rest low enough to cause pressure, where the De Vilbiss flap would be more freely movable and pressure less likely. If this beveled edge were tacked firmly down with a small silver nail, this difficulty might be overcome, and still the chances of the lower edge being bent in by this nail would be a point for consideration.

III. HAVE THE RESULTS OF REMOVING TUMORS OR CYSTS BEEN PERMANENT AS REGARDS (A) THE RELIEF OF SYMPTOMS; (B) RECURRENCE OF TUMORS AND CYSTS?

Cysts that were due to trauma and located on the cortex were successfully removed by all the Fellows reporting cases. These cases were relieved of their symptoms and there

[1] Read before the Chicago Surgical Society March 7, 1913. See discussion p. 388.

was no recurrence reported. Two cysts of the hypophysis were reported, with one death.

There seemed to be great difficulty in locating tumors after the skull was opened, and only a few of the Fellows reported attempts at complete removal. The attempts were accompanied by a very high mortality, with some of the cases reported as completely relieved, and others partially relieved. The position and histopathology of the tumors that were removed successfully would, of course, be very valuable information, but it was not volunteered in the answers. The malignant tumors were uniformly fatal, the operation only serving as a temporary check in a few and hastening the end in the others.

IV. WHAT METHOD DO YOU USE FOR LOCATING A BRAIN ABSCESS?

There was a marked uniformity of opinion, except where the question was misunderstood. The question really related to the technique after the cranium had been opened, but could be and was construed by some to mean the clinical localization. A blunt trocar and a grooved director were the only instruments considered in the reply. One Fellow emphasized strongly the necessity of having several openings in the sides of the cannula. The grooved director was warmly supported by several as even a better conductor of the fluid than the cannula, but it may have been that the cannulæ that they used presented only the one opening, which was carried beyond the pus pocket and in that way proved useless by the fact of its being withdrawn too rapidly to allow the pus to run through, or that the soft brain substance was forced into the single opening after the removal of the trocar by the increased intracranial tension. This would be avoided by the use of the cannulæ with multiple openings.

V. HOW DO YOU DRAIN A BRAIN ABSCESS, AND FOR WHAT LENGTH OF TIME?

To this question the answer that "it should be drained until all discharge ceased" was the most frequent. The materials used varied from braided silk, silkworm gut, iodoform gauze, gutta percha, cigarette drains, rubber tubes, to silver tubes especially constructed, so that any length or size could be obtained. The time of cessation of the discharge varied from two or three days to several months, it being emphasized that the deep or central abscesses required drainage much longer than the superficial abscesses. One Fellow emphasizes the necessity of putting the tube to the bottom of the abscess before it has had time to collapse.

No one seemed to think that a fenestrated tube was necessary for drainage, and no one spoke of making a wider opening than was needed for the tube or drain.

The position of the patient to favor drainage was also not considered in any answer, but its value where the tissues are so soft and easily burrowed should be emphasized.

VI. HAVE THE ABSCESSES RECURRED? IF NOT, TO WHAT EXTENT HAVE THE PATIENTS BEEN RELIEVED?

Taken as a whole, the answers indicate that about thirty per cent of the deep abscesses have been cured, so far as the discharge of pus is concerned. That they frequently refilled, requiring the establishment of drainage, was also brought out very forcibly, and in this regard it seems well to consider the silver tube which could be left in much longer than has been customary by the Fellows, and which would have a more or less antiseptic action, which might aid the very delicate nervous tissues to throw off the infection.

Death in these cases resulted from causes varying from leptomeningitis to abscesses in other parts of the brain. Complications have varied from epilepsy two years later to feeblemindedness.

The superficial abscesses arising around the mastoid seemed more favorable, recurrence being infrequent and results good.

VII AND VIII. WHAT METHOD DO YOU USE IN MAKING A DECOMPRESSION OPERATION?

To this question the great majority of the answers gave an osteoplastic flap, in which the dura was also opened, but only a few

stated the location chosen for decompression. Several used the decompression methods of Cushing, both subtemporal and suboccipital, with the muscles split, the bone trephined and rongeured away, then the dura opened by a crucial incision, so as to allow the brain to protrude.

Those who made osteopiastic flaps did not state just the position chosen for decompression, and did not state if any untoward results had occurred from the different positions selected.

I believe it is well to copy the statement of one Fellow here as to decompression: "The results in non-malignant cases were splendid, particularly in the tuberculomata, occurring in young people. This should be done at the earliest sign of optic change, and then tuberculin should be given. Tuberculous tumors represent about fifty per cent of all the neoplasms that come under my observation. The great bulk of them live after decompression, and if their vision was intact at the time of decompression it remains good. This is the most important procedure in connection with brain tumors, as it gives splendid results and conserves vision and life."

Quite a few had only performed decompression in malignant cases where the benefit was transient, and some had not done the operation at all. One Fellow speaks strongly in favor of decompression in basilar skull fractures, where there is pressure due to subdural hæmorrhage. Another feels equally sure that it is of very little value in those cases. If any of the Fellows have had a wide experience in this line, it seems that it would be valuable to bring it out in the discussion.

To sum it up, about one half of the replies were to the effect that the operation was one of merit when the tumors were not malignant.

IX. HAVE YOU USED DECOMPRESSION AND DRAINAGE IN ACUTE LEPTOMENINGITIS? IF SO, WHAT HAVE BEEN THE RESULTS?

Only five Fellows had used this operation — a total of ten times, with death in all cases. No details as to methods or time the disease had endured were given.

X. OF WHAT VALUE HAS REMOVAL OF A TUMOR, CYST, OR SCAR BEEN IN RELIEVING JACKSONIAN EPILEPSY?

In answer to this question, five Fellows stated that they had never had any definite permanent results. Three Fellows report a total of five cases, with results that were very satisfactory. Three report three cases cured. One Fellow states that about five per cent were cured, plus ten per cent improved. Two Fellows emphasize the necessity of seeing the case before the condition has existed too long, giving the results from early cases as irregular and late as failures.

In this regard the value of the answers would be much enhanced if the time of operation following the onset of the symptoms had been given, because there must be some reason for the opinions which are so radically different.

XI. HAVE YOU NOTICED A PARESIS OF THE EXTREMITY FOLLOWING THESE OPERATIONS; AND, IF SO, HAVE THEY BEEN PERMANENT?

Nearly all of the Fellows had had cases with more or less paresis of extremity on opposite side following these operations, and the paresis proved transient except in a few. In malignant cases it was permanent. This paresis does not seem to be of moment to the greater number of Fellows, while others have noticed a paresis of the opposite extremity accompanied by astereognosis, which endured for some time. This testing for astereognosis should be more frequently done.

XII. OF WHAT VALUE HAS THE ELEVATION OF OLD DEPRESSED SKULL FRACTURES BEEN IN RELIEVING THE LOCAL AND GENERAL SYMPTOMS?

To this question the most uniform answer was that it was necessary to relieve the pressure early, and that unless it was done early the result was always poor. One Fellow found the greatest relief when the bone was completely removed over the area. In some answers the time of the operation was not stated, and the relief was irregular.

All considered, the answers were the same as those to a scar or tumor, but the necessity of early attack was much more strongly emphasized.

XIII. HAVE CRANIAL DEFECTS BEEN RESPONSIBLE FOR SYMPTOMS IN ANY OF YOUR CASES? IF SO, HAVE THE SHAPE AND SIZE OF THE DEFECT HAD ANYTHING TO DO WITH THE SYMPTOMS? HAVE YOU USED PLATES OF BONE OR METAL IN RELIEVING THESE, AND HAVE THEY BEEN SUCCESSFUL?

To this question there was very marked difference of opinion, eleven stating that they had never observed any symptoms which were referable to cranial defects, and one of these had observed a case of large defect of sixteen years' standing, with no symptoms, and five feeling that they could be responsible for headache, irritability, and even as an excitant to epilepsy. These five surgeons had used different methods to relieve the condition. One had separated the brain from the adherent dura and inserted a plate of coal tar paraffin, which would mould at 100° and melt at 120°. This foreign body was tolerated and the symptoms relieved. Another had used various methods and various foreign substances, some of which it had been necessary to remove, but he felt that some relief had been obtained. Another had relieved symptoms with a celluloid plate, and another had used a silver plate successfully. One had used osteoplastic flaps to obtain a satisfactory result.

With such a wide difference of opinion, one must necessarily feel that there is some underlying fact which will give symptoms in one case and not in another. It would be well to consider these defects in different locations on the skull, because a defect on the vault would be much more likely to be irritated by any attachment to an elastic membrane, like the scar or scalp covering it, than a defect on the side or base, where there would be less pull.

Another factor for the different opinions rendered would be the shape of the defect. For instance, an oblong defect, one and a quarter inches wide, well up on the vault, would present an area large enough to give a very definite tug with each step, while a longer defect would enable the skin and scar to follow the brain until it was on its relatively firm waterbed, thus avoiding a tug. It seems well to suggest these things in the hope of bringing out a discussion in which the location and shape of the defects could be ascertained, which did or did not cause symptoms.

XIV. ARE YOU OPERATING FOR IDIOPATHIC EPILEPSY? WHAT ARE THE RESULTS?

To this question there were only two sets of answers, with the exception of one Fellow. The first group had not operated for idiopathic epilepsy; the second group had operated a total of about thirty cases, as near as deductions could be made, and they had not observed a single case to be benefited. One Fellow is operating at the present time at the suggestion of a neurologist, where a cortical œdema is suspected. When the operation is made, a cranial defect is left which is covered with the soft tissues, which are allowed to drop down upon the œdematous area, so that a contraction and shrinking could take place and relieve the œdema. His results were not stated.

DEPARTMENT OF TECHNIQUE

AN OPERATION FOR THE CURE OF RECTOCELE AND RESTORATION OF THE FUNCTION OF THE PELVIC FLOOR[1]

By GEORGE GRAY WARD, JR., M. D., New York City

THIRTY years ago, Thomas Addis Emmet, when reading his paper on a new method of perineal repair before this society, felt it incumbent upon him to apologize for presenting a subject which had become so threadbare from frequent discussion. Since that epoch-making contribution, no year has gone by without further additions to the subject, until it would seem that papers dealing with the problem of restoring the function of the pelvic floor were like Tennyson's brook.

That there is yet some meat left in this nut, in spite of its having been so thoroughly cracked, is the excuse I have to offer for trespassing on your time and patience. Since Emmet's enlightening paper, the subject of pelvic floor injury divides itself naturally into two divisions: (*a*) True lacerations of the perineal body itself, the "median line tears," which become of importance only when the injury impairs the function of the sphincter ani. (*b*) Injury to the pelvic fascia and levator muscle,— the so-called "sulcus tears," as a result of which one of the important functions of the posterior segment of the pelvic floor is crippled,— namely, the ability to properly close the vaginal mouth.

In the first division of this subject, the nature of the injury is apparent, and likewise the principle of its cure; but in the second the conditions are more complicated and obscure, and consequently it has been most prolific in promoting discussion as to the proper methods for its relief. The results of an impaired pelvic floor function, the inability to shut the vaginal mouth, are a rolling down and outward of the anterior and posterior vaginal walls with their attached viscera, namely, the bladder and rectum. All authorities agree that there is produced by this prolapse a true hernia of these organs. Formerly the operation for the cure of cystocele and rectocele was to shut the vaginal mouth by means of an operation based on the Emmet principle, after first taking up the slack or excess vaginal tissue by a simple superficial denudation of the mucosa and suturing the edges together. While apparently this produced a good result, so far as appearances went at the time of operation, it is self-evident that the prolapsed bladder and rectum were but thrown into folds, which the daily distention with urine and fæces would soon obliterate. Consequently, the results were seldom permanent.

In recent years, the problem of curing cystocele has been thoroughly worked out. Hadra first (and later, Sänger) pointed out that a more radical procedure was necessary to insure a permanent cure. They showed that the bladder must be completely separated from the vaginal wall, and also the uterus, so as to allow of its being shifted to a higher plane in the pelvis from whence it came, and then the excess vaginal wall resected. The operation devised by Goffe is a typical example of the modern radical method for the cure of this condition, and contrasting it with the older methods it is analogous to comparing the Bassini operation with an attempt to cure an inguinal hernia by simple suturing together of the pillars of the external ring.

The conditions present in a rectocele are the same as in a cystocele. Here we have a true hernia or prolapsus of the rectum, just as in the case of the bladder. Likewise, the bowel has become enlarged and pouched by distention, so that there exists an actual increase in the size of the gut, similar to the condition of the base of the bladder in a cystocele.

However, the usual methods in vogue for curing this hernia are still based on the principle of the older operations of either denudation of the posterior vaginal tissue and approximation of the cut edges, or resection of the excess vaginal wall with plication of the bowel. The result, so far as the bowel is concerned, is to throw it into folds which must tend to be smoothed out by the daily passage of fæcal masses, especially if constipation exists. In all these operations a perineor-

[1] Read before the American Gynecological Society, Washington, D. C., May 7, 1913.

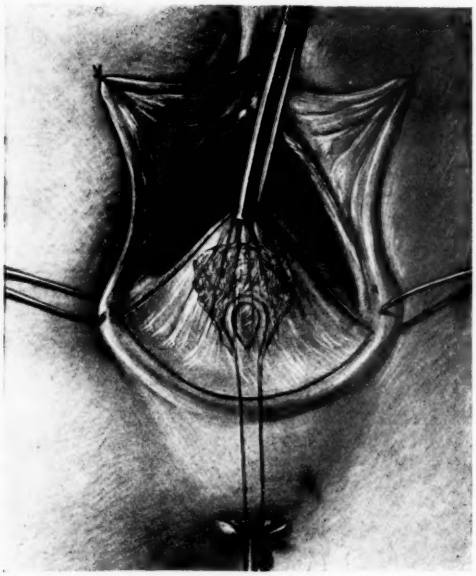


Fig. 1. The line of excision of the vaginal wall is first marked out with a scalpel, and a sponge with a holder is inserted into the rectum.

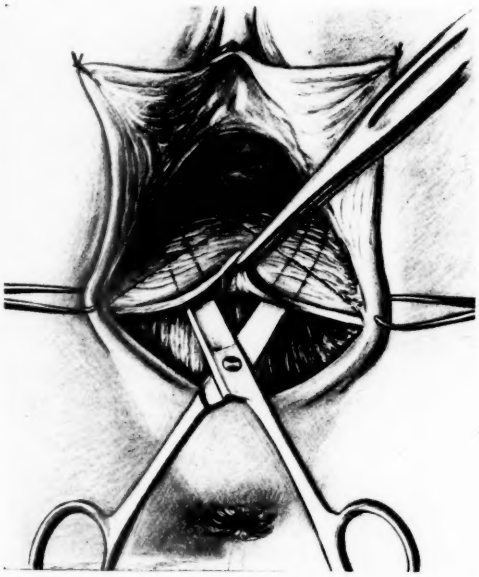


Fig. 2. The vagina is separated from the rectum with scissors. Note that the dissection extends well above the line marked for the excision of the vaginal wall.

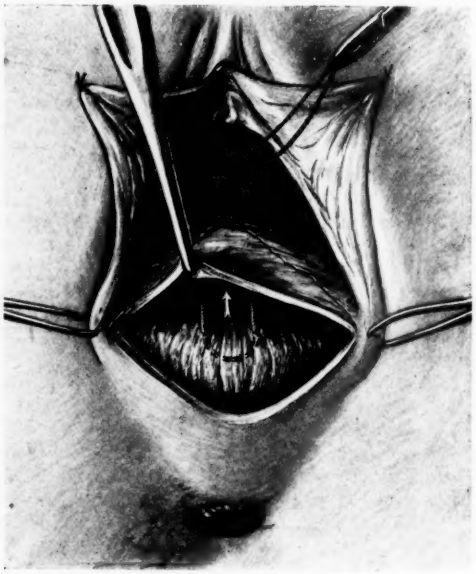


Fig. 3. The suture that is to draw up the rectal pouch to the upper third of the vagina is inserted.

Fig. 4. The excess vaginal wall is cut away along the line previously outlined.

rhaphy is relied on to close the vaginal orifice, and thus prevent further descensus of the vaginal walls. In the majority of cases with a small or moderate-sized rectocele, these methods are satisfactory in their results, the so-called "interposition" or muscle operation being superior to the typical Emmet, in the writer's opinion, so far as the rectocele is concerned. In cases in which there exists a large rectocele, however, the operations usually employed do not give as perfect a permanent result as is desired in some instances.

It is obvious that as the same condition exists in the rectocele as in the cystocele, we should apply the same principle to obtain a permanent cure as has proved so successful in cases of bladder prolapse.

For the past two years, the writer has utilized this principle in the operation about to be described, with uniform success.

The operation consists in first completely separating the rectum from the posterior vaginal wall, as far up as the cul-de-sac of Douglas, and then sliding the loosened rectal pouch high up along the vaginal wall by means of a suture. Thus the denuded rectum is carried up and placed so as to adhere strongly to the upper third of the posterior vagina which is above the former site of the rectocele.

The perineorrhaphy is next done in the form of a muscle operation. By the approximation of the anterior levator fibers, the muscle barrier thus formed acts as a dam to prevent any recurrence of a rectocele, in addition to restoring the function of closing the vaginal orifice. The perineorrhaphy to be described has been done in its essentials by the writer since May, 1908, with slight modifications from time to time.

The advantages of dissecting out the anterior edges of the levator muscle and uniting them in the median line, thus reefing the overstretched and elongated fibers so as to lift up the posterior segment of the pelvic floor, have been ably advocated by Holden, Babcock, Haynes, Sturmdorf, and others in recent years.

It has been the custom of the writer in teaching to draw attention to the analogous conditions in the mouth and the vaginal orifice.

In the mouth, we have a transverse slit with a fixed upper jaw and a movable lower jaw, the mouth being closed by the lifting up of the inferior maxilla against the immobile superior maxilla by the action of the masseter muscles. If these masseter muscles were cut or torn, there would result an inability to close the mouth, and the lower jaw would hang down.

In the vaginal orifice, the conditions are similar. We have the transverse slit of the vagina, the fixed anterior vaginal wall, and the movable posterior segment of the pelvic floor. The orifice is closed by the lifting up of the posterior segment against the immobile anterior vagina by the action of the levator muscle, just as in the mouth, and not by a sphincter action, in spite of the presence of a so-called sphincter vaginæ muscle.

The pelvic fascia gives support and strength to the levator in the vaginal sulci, and it is here ruptured by the advancing fœtal head when it receives the brunt of the strain during the process of internal rotation in the mechanism of labor, or it is torn, frequently in both sulci, by the blades of the forceps. A condition is then produced similar to a rupture of the fascia lata of the thigh when the strain in standing would fall upon the quadriceps extensor, with resulting tire and ultimate stretching of that muscle. The torn pelvic fascia allows the strain to come upon the levator muscle, and consequently it ultimately becomes stretched and relaxed. The result is that the posterior segment of the pelvic floor cannot be properly lifted up because of the elongated fibers of the levator.

When an injury to the pelvic floor of this type is fairly recent, and before sufficient time has elapsed to allow of much stretching of the levator, with a resulting rectocele of moment, an operation on the Emmet principle will suffice. But in cases of long standing, with greatly relaxed and overstretched levators, and associated with a well-developed rectocele, the writer believes that an Emmet operation is insufficient, and that the desired result is more perfectly acquired if the levator muscle is shortened or reefed, thus taking up its slack and restoring its function of lifting up the posterior segment of the pelvic floor, in other words, enabling the patient to again close her vaginal mouth.

In the operation as practiced by the writer, a buttonhole is made in each vaginal sulcus by passing a pair of closed scissors through the fascia, or the cicatricial tissue which has replaced it. This opens into the fossa in which lies the levator, the anterior edges of which are drawn out of the buttonholes with a forceps, and they are sutured together in the median line.

The approximation of the anterior borders of the levator ani has been criticised, as producing a weak support owing to the fact that muscle applied to muscle will not make a firm union. To give the necessary fascial support to this muscular union and thus overcome this criticism, the writer carefully sutures the edges of the

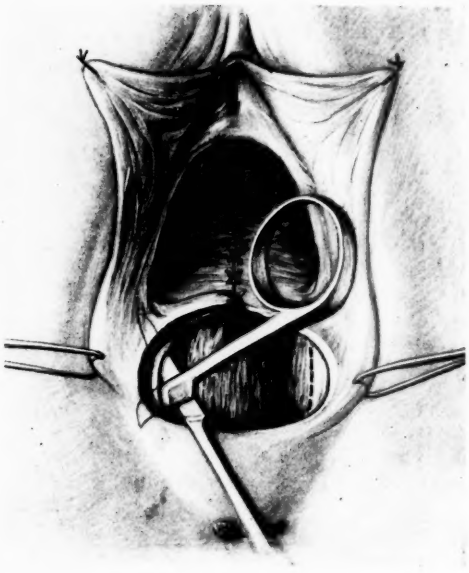


Fig. 5. The cut edges of the vagina are approximated with sutures. Scissors are passed through the pelvic fascia in the sulci, exposing the anterior border of the levator.

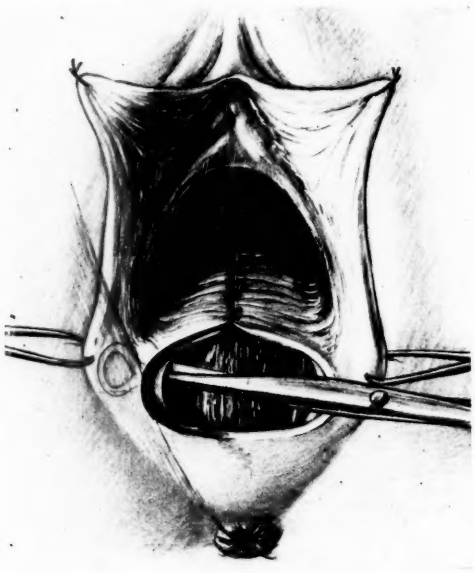


Fig. 6. A sponge forceps is passed through the buttonhole and the anterior edge of the levator is seized.

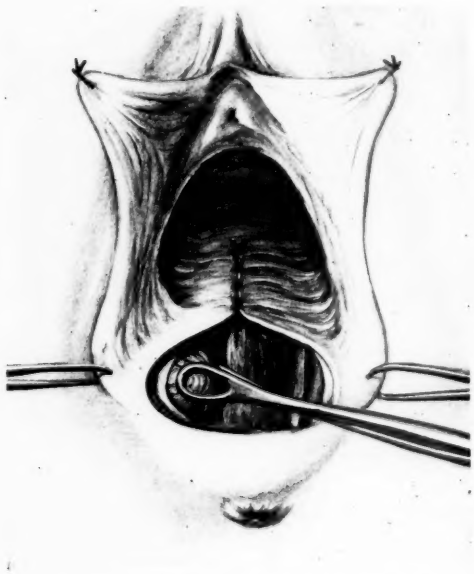


Fig. 7. The levator is pulled out of the buttonhole.

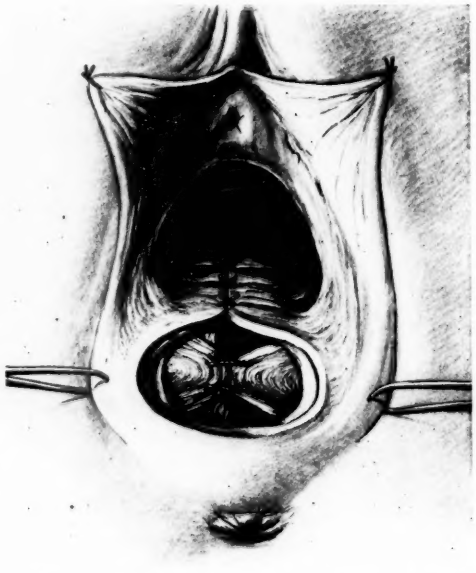


Fig. 8. The anterior edges of the levator is sutured together in the median line.

opposite fascial buttonholes together over the approximated levator fibers. The results of this procedure have been most satisfactory, as to the restoration of function, when used alone in cases without rectocele, and when combined with the rectocele operation.

Technique. The labia minora are first drawn aside and sutured to the skin, and a folded sterile towel to the perineum just above the anus. A gauze sponge on a sponge-holder is inserted in the rectum as a guide. Short bullet forceps are caught at each posterior caruncle immediately below the orifices of Bartholini's glands, care being taken not to occlude them. A third forceps is attached to the posterior vaginal wall in the median line, marking the crest of the rectocele. Traction is made on these tenacula and the resulting triangle is outlined with a scalpel. This triangle represents the excess vaginal wall which is to be subsequently removed. Marking its boundaries at the outset greatly facilitates its accurate removal at a later stage. (Fig. 1.)

With blunt pointed scissors, the base of the triangle is dissected from side to side, and the separation of the posterior vagina from the rectum is carried upward by inserting the blades of the scissors in the line of cleavage and opening them widely. Very little cutting is necessary, and the sponge in the rectum, the handle of which may rest on the operator's knee, makes a live guide as to the path of safety. The vaginal wall is entirely separated from the rectal wall from side to side and as high up as the cul-de-sac of Douglas. (Fig. 2.)

The rectum having been completely mobilized, a catgut suture is passed through the vaginal wall in the median line as high up as possible in the region of the cervix. This suture is brought down and made to catch up the rectal pouch about its center, and is then carried up and made to emerge through the vaginal wall in close proximity to its original insertion. When this suture is drawn up and tied, it obviously carries the dilated rectum up with it far beyond the limit of the subsequent resection of the vaginal wall. It thus approximates the denuded rectal pouch to the upper third of the vagina, which is above the site of the retrocele. (Fig. 3.)

The rectocele having been disposed of, the excess vaginal wall which entered into the formation of the rectocele is cut away along the lines marked out with the scalpel at the commencement of the operation (Fig. 4), and the cut vaginal edges are then sutured together with catgut. A pair of closed scissors are then passed through the fascia (or cicatricial tissue which has replaced it) in the vaginal sulcus. They are opened widely, and withdrawn, thus making a large buttonhole which opens into the space in which lies the levator. (Fig. 5.) The index finger locates the anterior portion of the levator (frequently it can be readily seen) and the muscle is caught with a pair of sponge forceps (Fig. 6) and drawn out of the buttonhole (Fig. 7). The opposite muscle is secured in the same manner, and they are sutured together in the median line with chromic catgut. The effect of this is immediately apparent, the shortening of the muscles lifting up the relaxed pelvic floor (Fig. 8).

Fig. 9. The outer edge of the fascial buttonholes are sutured together over the levator fibers with catgut. Silkworm sutures are then passed from the skin surface behind the entire muscle approximation.

The outer edges of the fascial buttonholes are next sutured together over the approximated muscles with catgut. This step the writer lays stress upon as an important factor in giving these muscles a fascial support. The operation is then completed by passing three or four silkworm gut sutures from the skin surface behind the entire muscular approximation. These are tied, and they are the only sutures appearing externally. Their purpose is to give strength, thus allowing the use of finer catgut for buried sutures, and should there be a failure of primary union they will hold the tissues together sufficiently to give a fair chance of a satisfactory result by granulation. (Fig. 9.)

DEMONSTRATION OF THE INFANT PULMOTOR, WITH REMARKS ON ITS USE IN THE TREATMENT OF ASPHYXIA NEONATORUM[1]

By HENRY D. FRY, M. D., Sc. D., Washington, D. C.

THE Draeger Pulmotor is well known to the profession and to the public by newspaper reports of its successful application for the resuscitation of the apparently dead. Such accounts have come from various and widely separated centers of population and from many mining districts. Life was restored to victims of various accidents—drowning, electric shocks, the inhalation of noxious gases, and nitric acid fumes. The use of the apparatus is applicable to cases where respiration is arrested, but where there is still some heart action.

Owing to a demand from obstetricians and maternity hospitals for a pulmotor to treat asphyxia neonatorum, Mr. Bernard Daeger has modified the original instrument and manufactured an infant pulmotor.

The first consignment of these pulmotors was received in this country about one year ago, and orders were filled to the following: Dr. Clifton Edgar, Dr. Barton C. Hirst, The Georgetown University Hospital (Washington), The New York Lying-In Hospital, The George Washington University Hospital (Washington). Recently an instrument has been supplied to the Rochester Railway and Light Co. and placed in the Rochester General Hospital.

The infant pulmotor weighs twenty pounds, and is carried in a box case 19 inches by 10.5 by 4.5. It contains a cylinder of oxygen gas and an extra cylinder is furnished to be kept charged and ready to insert in the place of one that may be exhausted. There is a gauge attached to give warning when the amount of oxygen is low. Each cylinder contains sufficient oxygen for the continuous working of the apparatus for one hour. The mask is applied closely over the mouth and nose of the infant while the lungs are being inflated and deflated. The rapidity of the inspiratory and expiratory movements are regulated by a small lever, and inflation of the lungs of the infant can be timed so as to be coincident with any voluntary movements of the chest walls. Two flexible metal tubes connect the instrument with the mask; one forces the oxygen into the lungs under the required pressure, and the other is for suction to remove vitiated air from the organ. The oxygen is forced into one tube to inflate the lungs, while the suction from the other deflates them. The force of inspiratory pressure and suction pressure are each controlled at will by a water gauge and dial graduated in centimeters up to 25. I have found that about 15 or 20 centimeters force was most satisfactory.

Our first work with the pulmotor at the Georgetown University Hospital was one of experimentation on dead infants. The apparatus was applied and the lungs inflated and deflated. To accomplish this it was necessary to act before rigor mortis had set in. At first the pressure of the oxygen caused distention of the stomach as well as of the lungs, and to prevent this, we inserted into the œsophagus a small gauze sponge attached to a string. On one occasion I delivered a dead infant weighing 8.25 pounds. The mother was suffering from placenta prævia centralis, and the infant was delivered slowly after combined version. While I gave my attention to the mother, the dead infant was handed over to my assistant, Dr. Prentiss Willson. There was no hope of resuscitation, as the heart action had ceased, but the pulmotor successfully inflated the lungs, causing expansion of the chest walls; then deflated them and produced rhythmic respiratory movements. The gauze sponge had been inserted into the œsophagus, and after completing the experiment the abdomen of the infant was opened and the stomach was found not inflated. Instead of the sponge applied in this way to prevent the gas from distending the stomach, Dr. Roth, of Lubeck, found that pressure on the trachea would accomplish the purpose. "This pressure does not restrict the circulation of air in the semi-rigid windpipe." He adds that "the accuracy of this reasoning has been proved by experiments with a surgical subject, a flexible tube being sewn, air tight, in the stomach, and the other end immersed in water. On setting the pulmotor in operation, the air bubbled up through the water; but a gentle pressure with the fingers on the windpipe caused the bubbles to cease immediately. At the same time the cavity of the chest and the diaphragm moved in an admirable manner; in fact, the quiet breathing of the cadaver was astonishing at first sight." The introduction of the infant pulmotor into obstetric practice is so recent that I have not been able to collect any statistics of the value of the apparatus.

[1] Read before the American Gynecological Society, Washington, D. C., May 6, 1913.

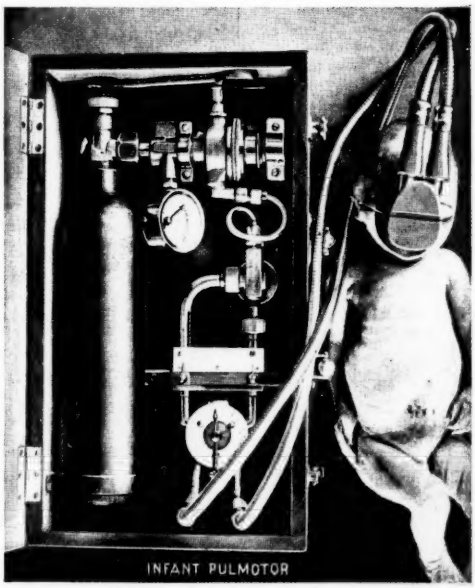
Certainly it is vastly superior for resuscitation to the ordinary methods of artificial respiration. We have had no opportunity to test it in a serious form of asphyxia, the so-called asphyxia pallida, but in the livid form it has acted promptly and resuscitated the infant in about five minutes.

Hoping to gather some information regarding the experiences with the use of the infant pulmotor, I wrote letters to each of the parties who had purchased the apparatus. I wish to express my thanks to Drs. Edgar and Hirst for their prompt responses and the aid they have given me. The New York Hospital was not prepared to make any statement on the subject, while no reply whatever was forthcoming from the George Washington University Hospital.

Dr. Edgar says he has used the apparatus six or seven times in both asphyxia pallida and livida. The results were good, much better than he had anticipated, because at first he was doubtful of the value of the apparatus. Quoting a part of his communication, he says, "Two cases stand out prominently, because I believe the babies were saved by the infant pulmotor. One for a doctor of this city, in which we had to deal with a shoulder presentation of some hours standing and a prolapse of the cord. I was so certain the child was dead that I boiled up my decapitating scissors, but finally, against my better judgment, did a version. The child, apparently dead, I finally made to breathe with the infant pulmotor. It is still alive.

"The second case was at my Tuesday Clinic at the Manhattan Maternity. Here we had prepared for a perforation of the head, but I finally extracted with forceps and resuscitated with the pulmotor before the class. The fœtus was considered dead before the delivery."

Dr. Hirst writes: "We have had the pulmotor in use about nine months or more. No record has been kept of the number of times it has been employed. It is brought out every time there is an instrumental delivery of any kind, and it has been used, I should say, about 15 or 20 times. Occasionally it has succeeded where other methods have failed completely, but it has also failed completely, and we find that when there is great difficulty in reviving the baby, it does not usually survive more than a day or two."


INFANT PULMOTOR

TECHNIQUE FOR THE USE OF THE PULMOTOR

The mouth, throat and upper air passages are freed of mucus by gauze wrapped around the finger and by holding the infant head downwards. It is then placed in the dorsal position upon a table or hard surface, shoulders raised and head extended. If relaxed, the lower jaw must be held up and pushed forward. The tongue is pulled well out with a silk thread passed through the tip. This is preferable to the forceps or tenaculum, as it does not interfere with the close application of the mask. The mask is tightly applied to the face, covering the mouth and nose, and held firmly by an assistant or by a rubber band encircling the head. The scale regulating the force of inflation and deflation is placed at ten or fifteen centimeters, and if this be not sufficient to expand the chest walls it is increased to the desired amount. The trachea is pressed gently against the spine so as to close the œsophagus, and if this is not enough to prevent distention of the stomach, a small gauze sponge, attached to a string, can be placed in the œsophagus below the larynx.

Inspiratory and expiratory movements are induced by moving the lever alternately from side to side, filling the lungs and expanding the chest walls, holding the inflation for a few moments, and then deflating the lungs. If the infant should make any voluntary efforts to breathe, the manipulation of the apparatus should be so timed as to inflate during the inspiratory efforts and deflate during the expiratory. Efforts to resuscitate the infant should not be abandoned as long as there is any heart action.

THE OPERATIVE TREATMENT OF INACCESSIBLE VESICO-VAGINAL FISTULÆ

By F. W. PARHAM, M. D., New Orleans

MRS. E. consulted me in June of last year for a distressing vesico-vaginal fistula, the result of a total hysterectomy done for carcinoma not quite three months previously.

Digital examination showed the absence of the uterus and a somewhat shallow and contracted vagina. At the apex of the left vaginal sulcus the finger could easily palpate a round opening in the bladder. In the Sims position this could be well seen through an illuminated rectal speculum. Water thrown into the bladder flowed freely into the vagina, and a uterine sound, properly bent, could be carried without difficulty into the bladder from the vagina and from the bladder into the vagina. The fistulous opening was surrounded by hard cicatricial tissue and presented a problem that promised to tax surgical ingenuity.

Her condition was deplorable and appealed most piteously for relief. Urine dribbled almost constantly, keeping her wet nearly all the time. She wore a urinal, which in some measure mitigated her misery by permitting her to go about, but the urinal itself became a nuisance owing to the urinous odor which was at times most disagreeably pronounced.

I set about the effort to relieve her on June 5, 1912, when I attempted a direct closure of the fistula per vaginam. Vaginal flaps were lifted and turned back from the opening, and two sutures were carried through both margins of the fistula. These were used to pull the fistula down, so that freshening of the edges and suturing could be better done. This being done with catgut, the vaginal mucosa was closed with silkworm gut. A retention catheter was put in and left for about four days.

The technical difficulties were great, so narrow was the space for manipulating, and the operation was quite prolonged, but the closure appeared satisfactory and I felt hopeful of the result. For a few days there was no leakage and I felt encouraged, but on the fourth day there was some discharge of urine per vaginam and water thrown in through the retention-catheter passed into the vagina. This became more pronounced until it seemed as bad as before. Two weeks after the first operation I made a second attempt to close the fistula, which could now be plainly felt again.

On June 20th I opened the peritoneal cavity above the bladder and having packed off the pelvis with pads, made an attempt to reach the fistula, by detaching the bladder from above. The bladder was so bound down by cicatricial tissue that I soon abandoned this route. I then opened the bladder by a free incision and found without difficulty the fistula in the trigone of the bladder. Both ureteral orifices could be plainly seen in close relation with the fistula. Freshening was difficult and unsatisfactory but approximation was finally accomplished with chromic gut, the bladder wound sutured carefully and the peritoneal opening closed. The vagina was next exposed and the mucous membrane again united with silkworm gut. She was made to lie prone for the first twelve hours but this position became so intolerable that she was turned on the back again and the bladder kept emptied by frequent use of the catheter. For a week the condition was promising, but soon it again became evident that the bladder was draining through the fistula into the vagina and I had to acknowledge a second failure. This operation had lasted two and one half hours and my mortification was, I assure you, most keen. After regaining her strength sufficiently she was allowed to return to her home in the country about July 1st. I felt sure I should never have the opportunity of making another effort to relieve her.

In October she returned to the city and again consulted me. Her general health was better and she was determined to undergo another operation, if I thought it worth while. In the meantime I had made a search of the literature for some new suggestions. I found in Ashton's Gynecology a reference to George Gray Ward's operation for a fistula similar to that presented in my case. I looked up the original article[1] and found reported there two vesico-vaginal fistulæ both following complete hysterectomy and each showing the fistula situated high in cicatricial tissue, as in my case. Ward called them very correctly, I think, *inaccessible*. I determined to carry out his plan, as all others had miserably failed.

I operated October 26, 1912. The procedure is well illustrated in the cuts of Ward's article (Figs. 1 and 2). The essential features of the operation are:

[1] Surg., Gynec. & Obst., 1910, xi, 22.

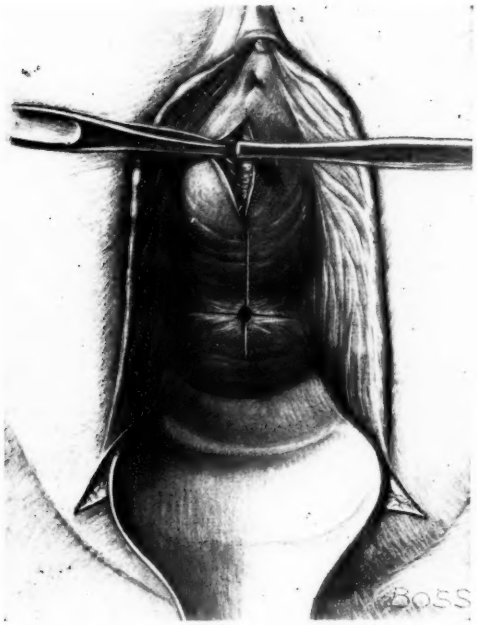


Fig. 1. Note point of commencement of dissection of bladder from vaginal wall where line of cleavage is easily found, before separating bladder from adhesions at the vault. Also paravaginal incisions.

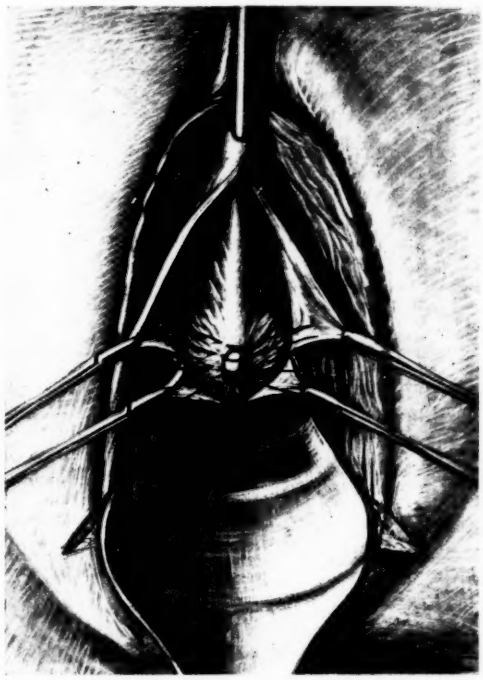


Fig. 2. The bladder having been separated from the anterior vaginal wall and vaginal vault is dislocated downwards out of the wide vaginal incision by means of a straight sound, making the fistula accessible.

1. Liberal dissection of the vaginal mucous membrane, so as to mobilize freely the bladder and bring the fistula within reach.

2. Beginning the dissection well forward, just behind the meatus urinarius where the natural lines of cleavage make it possible to separate easily the vaginal membrane from the bladder wall.

3. The use of a lever in the bladder to push down the bladder so as to make the fistula accessible for suture. This the technique accomplishes admirably.

In the dissection it is necessary to free the bladder especially thoroughly at the site of the fistula, otherwise the approximation cannot be satisfactorily done. The four flaps make this feasible. I was able to do the operation without making the complete transverse incision, only that part of it on the side of the fistula being needed. I found the technique comparatively easy and completed the operation with much less difficulty than either of the others.

No retention catheter was used, the bladder being emptied every two hours at first and at gradually increasing intervals until at the end of a week the urine was voluntarily voided by the patient. No leakage showed at any time and she left within three weeks for her home, perfectly happy.

I have a letter from the patient dated April 16th saying that she is well and happy and stouter than she had ever been before. There has been no leakage at any time. She has had from time to time considerable irritability of bladder, but this seems not to be giving any disturbance at present.

The operation as here outlined has as its prominent feature the free exposure and mobilization of the bladder so as to pull it down sufficiently to make it accessible. The inaccessible fistula then becomes quite accessible.

This mobilization of the bladder, of course, is not new, for it has been done by many operators since A. Mackenrodt, of Berlin, so clearly described its technique in 1894[1]; but the special

[1] Zentralbl. f. Gynäk., 1894, No. 8, 180.

technique as given by George Gray Ward for the cases of fistula consequent upon total hysterectomy is so plain and simple that it will appeal to any surgeon when confronted with such a case, and especially after several failures with other methods. It is practically the modern operation for cystocele with more extended dissection of the bladder. My intention has not been to discuss the treatment of vesico-vaginal fistulæ, for this has been thoroughly done in the works of Kelly and others, but merely to call attention to this simple method for this particular class of cases. I wish before closing to refer to the use of the fascial flap as an aid in the plastic operations. Schmidt[1] has reported one case which shows the value of such a flap. He had failed in two previous operations. In the third, after lifting the mucous membrane flaps and suturing the fistulous opening, he placed a flap of fascia lata directly over the sutured area, holding it *in situ* by a few catgut stitches. The mucous membrane was then carefully sutured over this. Union was prompt and the cure complete.

This is one of the latest uses of the fascial flap deserving of consideration. Perhaps either the first or the second operation might have proved successful had I interposed one of these flaps.

[1] Abstract in Am. J. M. Sc., March, 1913.

LIGATURE SCISSORS

By JOHN M. BIRNIE, M. D., Springfield, Massachusetts

THE scissors here shown are primarily intended to be carried in the hand of the operator or assistant while working, the thumb and first two fingers being available for sewing or tying. If not carried in the hand, they may be grasped without introducing the finger through the ring and are very rapid in action. While of use in any operation, their chief value is apparent in operations requiring numerous ligations, such as operations upon the breast or thyroid.

A METHOD OF APPLYING HEAT BOTH TO INHIBIT AND DESTROY INOPERABLE CARCINOMA OF THE UTERUS AND VAGINA [1]

By J. F. PERCY, M. D., Galesburg, Illinois

TO the sane surgical mind, inoperable carcinoma of the uterus is a subject to be dismissed with sorrow, but not with regret. Whether this attitude is justifiable or not, the fact remains that 75 per cent [2] or 80 per cent [3] of all cases of cancer in the pelvis and vagina are absolutely beyond any beneficial aid from operative surgery when they are examined for the first time.

But, practically, the word "inoperable" when applied to advanced cancer, is difficult to define. Cancer varies in virulence, or perhaps it can be better stated by saying that individuals are not alike in their resistance to its inroads. We have, in cancer, the prototype of fibroid phthisis, the slow, lingering form; and, again, that of phthisis florida, which runs a rapid course. Between these two extremes, we have all degrees of progress and resistance. Unfortunately, at the present time, neither the laboratory or clinical experience can aid us in any attempt we may make to classify these patients when they first present themselves for treatment. We all know the tragic ease with which, occasionally, a small carcinoma of the cervix uteri can be insulted into active virulence when a complete or partial removal of the uterus is attempted with the knife. On the other hand, it is within the experience of many surgeons, who have used the cautery merely as a palliative measure in a far advanced stage of cancer of the cervix and uterus, to have obtained results so favorable that they are almost tempted to doubt the original diagnosis.

There are certain clinical factors in reference to the pathology that are of practical import when it comes to selecting the method of treatment as between the radical operation of the character of the Ries-Wertheim, or employment of heat by the method outlined below. The first of these is the gross appearance of the growth. No one, to-day, would select an enormously enlarged, exuberant, bleeding, juicy, stinking, fungus-like mass springing from the crater-shaped edge of the cervix as favorable for treatment by the knife. In some of my cases, the vagina has been ballooned by this form of growth to a degree not unlike that found during the passage of a child's head in labor. The eroded edge of the cervix is frequently half an inch or more in thickness; while the diameter of the ulcerating craterous mass may be three or more inches across. Interestingly enough, this fearfully active and destructive process responds more readily to the application of heat than does the type where the exuberant growth is not so much in evidence.

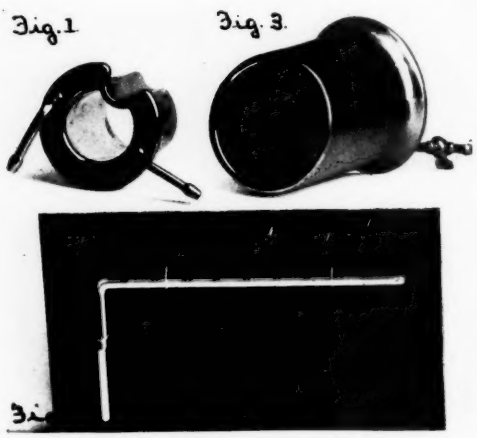
It is a very practical clinical method of designating these cases to refer to them in the first instance as the "vegetative" or "everting" form of growth, in contra-distinction to the "infiltrating" or "inverting" form of the disease. This latter is the squamous-celled type of carcinoma of the cervix, which occasionally involves not only the vaginal portion of the cervix, but the general vaginal walls as well. When this occurs, there is not much ocular evidence of its presence, but, digitally, small pearl-like masses can be felt which develop not only from the surface structures of the vagina, but from its deeper tissues as well. It is this infiltrating form that is exceedingly vicious in its tendency to recur, when once its host is disturbed and laid bare by the knife of the surgeon. It is a curious and interesting fact that adeno-carcinoma of the body of the uterus seems to be a much less virulent disease than the same cell when at work in the cervical canal. It is a much more difficult matter to arrest the progress of carcinoma where its greatest activity seems to be at the junction of the body of the uterus with the cervix; and it is this type of case that my records will show requires usually more than one application of the cautery heat. When the cervical mucous membrane cannot be moved on the underlying structures, one is always justified in suspecting the early stages of a malignant process.

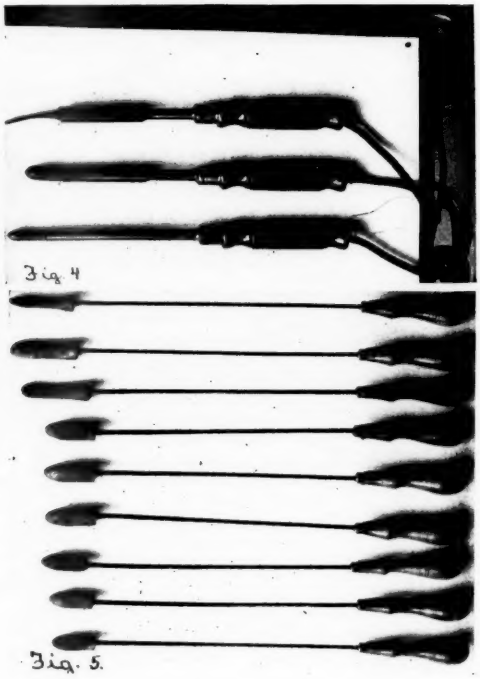
The technique which I shall outline is based upon the time-immemorial fact that high degrees of heat positively retard malignant growths on the surface of the body. The late Dr. Byrne, of Brooklyn, N. Y., applied this knowledge to the treatment of early carcinoma of the cervix uteri, twenty-five or more years ago. He reported 60 per cent of cures in the class of cases in which the Ries-Wertheim complete hysterectomy has since been developed with great skill by these surgeons.

The lack of resistance of the carcinoma and

[2] Reuben Peterson. [3] J. Wesley Bovée.

[1] Read before the Chicago Gynecological Society, March 21, 1913. See discussion p. 391.





sarcoma cells to heat has been worked out by many experimenters. Among these may be mentioned Leo Loeb, to whose work I had the pleasure of referring in a previous paper.[1] More recently Lambert,[2] of New York, has shown the difference in resistance to heat between the cells of sarcoma and actively proliferating connective tissue cells.

I have applied heat in the treatment of these inoperable cases, because to attempt either the Byrne or the Ries-Wertheim operation would be utter foolishness. When the cervix is no longer a cervix, but merely a mass of malignant overgrowth with involvement of the vaginal walls, especially along the urethra; when the uterus is fixed from extension of the disease so that it involves the broad ligaments, adnexæ and parametrium, together with the bladder and uterus; then the technique that I shall outline below is the only hope, and I believe that my experience will show that it is much more than a hope. When the abdomen is opened, the extent of the pelvic involvement, with the degree of extension along the ureters, rectum, sigmoid, and bladder can be determined. I now make the abdominal incision large enough to palpate the liver, stomach, and pancreas. If the liver and stomach are the subjects of metastases, but the patient is otherwise a fair surgical risk, I proceed with the application of the heat for the reason that where I have done this there seems to be an arrest of the actively progressive phases of the disease, for a time, at least. Enlarged glands along the common iliacs or ureters, especially if they are not hard, need not necessarily be considered as harbingers of malignancy.[3] This, many times, has been my own experience. Indeed, it is rather rare to find carcinoma in the enlarged ureteral lymphatics, unless the pelvic involvement is extreme. Mayo called attention to an analogous fact in his early work on resection of the stomach for cancer, viz., that enlarged glands always indicated infection, but not necessarily with carcinoma.

As a preliminary to any form of treatment of cancer of the cervix or uterus, whether by heat or with the knife, the curette has absolutely no place. Many of the rapid recurrences of cancer in this region, following the ill-advised use of the curette, are due to this instrument and not to the particular virulence of the carcinoma cell of the patient. The curette excites into new activity the patient's infection in exactly the same way as when, in the experimental laboratory, a thread is drawn through a cancerous growth of the mouse. Those who have studied cancer in serial section will remember that occasionally the knife of the microtome will reveal a blood vessel wall

[1] Ibid.

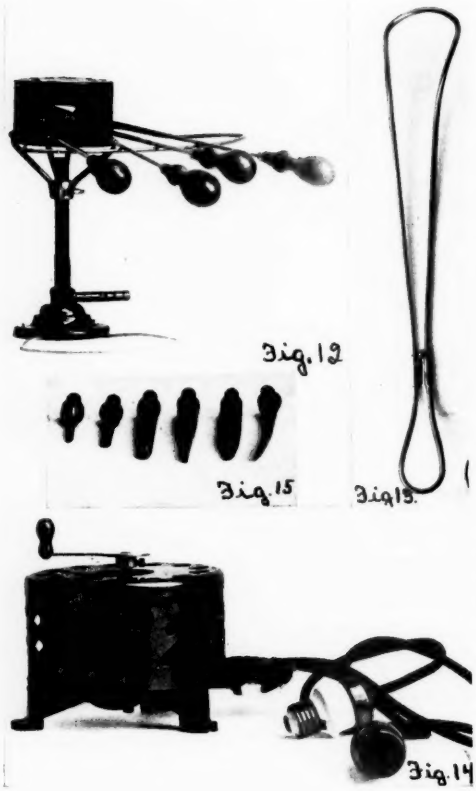
[2] Demonstration of the Greater Susceptibility to Heat of Sarcoma Cells as Compared with Actively Proliferating Connective Tissue Cells. Robert A. Lambert, M. D., New York, J. Am. M. Ass., Dec. 14, 1912.

[3] Prof. Weibel.

that has been destroyed by the disease in part of its circumference, and the tube is filled with cancer cells that have been caught in the blood stream by the hardening process. These vessel walls are held rigidly open by the surrounding pathology. Use the curette, and of necessity vessels that have not been touched by the eroding effects of the progressive cancer growth are opened, and plastered full not only of cancer cells but a multitude of infecting organisms to be distributed to any and all parts of the body. Is it necessary, after the statement just made — with which, I am sure, none will disagree — for me to say that to use the curette and follow it by the application of zinc chloride, calcium carbide or acetone, is no longer a justifiable procedure?

Again, in the technique that I shall outline, the exuberant overgrowth of the cancerous mass is valuable as fuel to feed the cautery for the development of heat which is so necessary for the successful application of the treatment. This heat does not open up vessels, as does the curette, but seals them instantly. It can, therefore, do no possible harm such as is done by the curette. For the same reason, the uterus becomes a valuable asset, merely as kindling, for raising the temperature throughout the pelvis to at least 115° F. (46° C.). The uterus is practically destroyed by this, or a greater degree of heat, which is often used. When the final repair occurs, this organ is left a sloughing, healing, cicatricial mass, in which the further development of carcinoma is practically inhibited. It is only fair to remind you that the treatment of the outermost confines of the disease is the crux of the whole situation in the application of heat, as it is in the use of the knife, but with this difference,— that the latter requires the removal of everything that it touches, if possible, and this implies that we are practically carrying carcinoma cells for further infection. On the other hand, the difficulty with the heat problem is that it requires, at present, the unaided judgment of the one applying the treatment. To know how much heat to apply at the central point in order to get the correct beneficial amount at the outermost limits of the pathology, minus its destructive possibilities, is with our present methods difficult, unless, with the same assistant, one has treated many of these cases. I have tried to assist this unaided judgment of the average operator by the suggested use of the thermometer in the pelvis, bladder, and urethra.

I am frequently asked in reference to perforation of the uterus by the cautery. Perforation has occurred in four of my cases, and in none of these has any untoward result followed. In one of the patients it was necessary, after several months, to use the cautery again. Not only had the perforation healed kindly, but there were no adhesions of either bowel or omentum to the cicatrix. In the Annals of Surgery for December, 1911, p. 769, this experience is also affirmed by Vogel and Webster. When the malignant growth has invaded the rectum, the operator's gloved fingers should be introduced through the anus, and the cautery point directed toward the posterior wall of the uterus, and the heat main-



tained there until it becomes quite uncomfortable to the operator's fingers in the anus. The bulb of a thermometer introduced between the malignant mass and the operator's fingers in the rectum will show that this quite uncomfortable degree of heat will vary, as indicated by the thermometer, between 110° to 113° F. (43° to 45° C.). This will be the experience of the assistant's fingers in the pelvis when the temperature is slowly raised in the uterus. In other words, the rubber-gloved finger of the average operator can stand a temperature of at least 110° F. (43° C.).

If carcinoma has invaded the bladder from the body of the uterus, two methods are available for the application of the heat. First, the use of my water-cooled speculum (Fig. 1) with a depressed groove at the top to allow of the introduction of a long-bulbed thermometer (Fig. 2) into the bladder through the urethra. The other method, which is also practicable, is to dilate the urethra sufficiently to introduce the index finger of the operator into the bladder. The urethra will tolerate stretching to a full half inch, and will recover in a few days, without functional damage. If the index finger is to be the guide, my electric cautery (Fig. 4), cannot be used as effectively as the cartridge shaped cautery (Fig. 5), because of the heat developed from the shaft of the instrument, making it uncomfortable for the rest of the hand. When the carcinoma has invaded the bladder from the body of the uterus, the problem of the application of heat is not as great as when this occurs from extension of the growth from the utero-cervical junction into the bladder. In the former event, I do not fear perforation of the bladder (i. e., from the uterus) as much as I fear an insufficient application of the heat. This last is the lesser of the two evils even when it is accompanied by perforation of the bladder. In one of my cases the bladder was perforated through the uterus; in two others, the rectum through the uterus; in another, both the bladder and rectum were perforated, again through the uterus. In all four of these cases, the fistulæ closed within six weeks from cicatricial contraction of the uterus. Vesico or rectovaginal fistulæ, however, are an entirely different problem. Indeed, when either one of the above complications occurs, it proves to be the most difficult of solution of any in the application of treatment by heat. In two of my cases, I was successful in arresting the flow of urine through the fistula only by closure of the upper part of the vagina, and making it a part of the bladder. In the rectovaginal fistula case already referred to, I have, after two operations, been unable to close it. I am at present at work on a method that I hope will, in both these cases, solve the problems of fistulæ by an operation modified after the method of F. Schauta's vaginal hysterectomy.

I had one case that was operated by a skilled surgeon in the West. A high amputation of the cervix was done. There was rapid recurrence of the disease with extensive involvement of the bladder and rectum. In this case, there was distressing incontinence of both urine and fæces, with absolute fixation of the uterus in the pelvis, together with practical closure of the vagina from involvement of its walls in the extension of the malignancy. This woman, aged 56, applied for relief only because of frequent and excessive hæmorrhages from the vagina. I opened the abdomen September 2, 1912, and thoroughly applied the electric cautery down through the body of the uterus from the fundus. I also burned off the uterine arteries with the cautery knife. I continued the application of the heat

until what was left of the uterus and its environs was completely movable in the pelvic cavity. This operation was made possible by using my water-cooled abdominal speculum (Fig. 3). The abdomen was closed without drainage, and the patient returned to bed. The procedure was followed by a sharp reaction that was manifest by a temperature of 103° F. (39° C.), for three days, after which convalescence was uninterrupted for one month. The marked cachexia cleared up, there were no more hæmorrhages, the anæmia disappeared, and the patient regained control of both the bladder and rectum. After this time, the patient showed signs of toxæmia, and gradually failed, dying of what appeared to be a mild sepsis, October 30, 1912. The post-mortem showed no adhesions of the bowel or omentum in the pelvis, and no evidence of the malignant process in the treated area was found. The pelvis, however, contained about a teacupful of pus, but the walls did not show any evidence of an active inflammatory process. I believe that this patient would have lived much longer if the vagina had been treated by the cautery, with the thermometer placed in the urethra to prevent its being heated to a destructive degree. Had this been done, drainage would have been instituted, which the post-mortem showed was vitally necessary.

One of the benefits that I wish to emphasize, following the application of heat, is the apparent lessened virulence of the metastases, should it follow in an advanced case after the treatment is applied. A new focus of malignant infection can develop in the liver, or even in the stomach; but it is not followed by the usual rapid destructive-to-life course of events that is characteristic of the process of metastases in the untreated case.

It is not necessary for me to repeat here the details of the method as published in my former paper.[1] The essentials have not been changed. For some unaccountable reason, it was not stated in that paper that after the patient was placed in the modified Trendelenburg position, the legs were elevated as for a vaginal hysterectomy. Shoulder braces are important to prevent the patient slipping away from the operator, especially if he uses his fingers and fist, lubricated with liquid soap, to dilate the vagina. This, however, is a somewhat difficult and tiresome thing to do. It can be much more efficiently done by making use of the vaginal dilator illustrated in Fig. 8. My rule is to dilate the vulvar entrance of the vagina with this dilator until the mucous membrane begins to separate at various points. The vagina will then usually admit the water-cooled speculum (Fig. 7) without further traumatism or difficulty. In a narrow, non-elastic vagina, especially if the malignant uterus has been drawn posteriorly into the pelvis, dragging the proximal end of the urethra down with it, the inner end of the water-cooled instrument will come up against this portion of the urethra, and when the cautery is applied (especially to the end of the cervix), will destroy the vaginal tissues covering the urethra, and lead to a vesico-vaginal fistula that is most difficult to cure because of the scar tissue incident to the burning. In order to obviate this danger as much as possible (illustrated by Fig. 8B), I use a water-cooled speculum that is longer, but smaller in diameter (Fig. 9), than the one ordinarily required.

I might say, in passing, that I have given up the glass vaginal speculum, illustrated in my former article describing this treatment, because of the fear of its breaking during the use of the cautery. This has been well replaced by the practically perfect instrument made for me. This instrument, and the one of the same design for use through the abdomen (Fig. 1) when the cautery is used in the pelvis from above, is kept cool by the use of ordinary tap water. The tissues in contact with these instruments are perfectly protected from the excessive heat of the cautery.

I have illustrated in Fig. 10 a water-cooled speculum that is open at the top. This instrument is a very practical one for the application of a degree of heat to be determined by the long-bulbed thermometer in the urethra (Fig. 2), sufficient (115° F.—46° C.) to inhibit the further progress of the disease, especially along the urethra. In this part of the operation, the heat should be raised very gradually as shown by the thermometer, for the tissues are slow conductors, and if one is not careful, irreparable damage is done to the urethra, and the prime object of this part of the treatment, the preservation of the urethra and vagina, defeated. The heat is maintained in the cervix and uterus until the walls can be easily collapsed by squeezing them between the assistant's thumb and finger, which are in the pelvis from the abdominal side. One important factor in the successful application of the treatment is the possibility of the operator shoving the end of the cautery into the broad ligaments, or under or into masses of the disease, directed by the assistant, whose fingers serve as a most practical guide not only to prevent the destruction of important tissues — as the ureters or sigmoid — but also to push the invaded tis-

[1] "The Results of the Treatment of Cancer of the Uterus by the Actual Cautery, with a Practical Method of Its Application." J. Am. M. Ass., 1912, lviii, 696.

sues down into the cautery. In this way the operator and his assistant can do almost perfect team work. The application of the heat is maintained until all of the infiltrated structures in the pelvis have felt the impact of the cautery for at least twenty minutes, and have had the temperature raised in them to at least 115° F. (46° C.).

A good practical guide as to the sufficiency of the treatment is the ability to freely move all of the tissues that were at first fixed in the pelvis. It should be remembered that when the greater part of the thickness of the uterine walls has been converted into charcoal by the treatment, care should be used not to roughly manipulate it to a degree sufficient to break through these charcoal walls, for fear that the sloughing process following the treatment should leak into the pelvis or abdomen. This has not yet been my experience, but the possibility can well be imagined. Another practical point to remember is that the assistant working in the pelvis must not mistake the edge of the water-cooled speculum in the vagina for malignant infiltrated tissue. Where there is a large, fungus-like, bleeding mass of carcinoma in the vagina, I use the cartridge-shaped cautery (Fig. 5) heated in the gas stove (Fig. 12) to a dull cherry red color. Heat greater than this cuts the tissues, and frequently causes them to bleed. I use these instruments until the malignant mass in the vagina is destroyed. While doing this, heat and steam from the wet tissues is being developed, and penetrates far beyond the actual presence of the hot iron.

A very practical instrument is the wire retractor (Fig. 13) which is used to lift the edge of a greatly excavated cervix within the sight of the operator and the reach of the cautery. It is used through a water-cooled speculum, and does not interfere with the use of the cautery. After using the cartridge-shaped cautery to destroy the gross mass springing from the cervix, I introduce my electric cautery directly into the uterus through the water-cooled speculum, and it is permitted to remain there as long as the assistant, from the abdominal side of the pelvis, does not find the heat greater than his fingers can stand in a given location. When the heat reaches this point, the end of the cautery can be moved by his direction to a new and unheated location. The assistant can also push the tissues, as already stated, into the cautery head if the operator, from the vaginal side, cannot direct the cautery so as to treat a particularly difficult to reach part of the pathology.

The cautery, heated by electricity as just mentioned, was described in my first paper (Fig. 4). Additional experience only confirms its value. It is the only cautery with which I am familiar that can always be depended upon as long as a lamp socket of 110 volts is working and can be obtained. It is not an electric cautery, in the ordinary sense, for the reason that the cautery tip is heated indirectly by contiguity, and not directly by the electric current. For this reason the patient, no matter what happens to the current, can never be brought into contact with it. The heat, therefore, is the same as that obtained from any cautery heated by gas stove, benzine, or ether. The rheostat (Fig. 14) that is furnished with the instrument enables one to regulate the heat to just the required degree. I have had the firm that first made the instrument for me add a number of smaller tips (Fig. 15), making it one of the most effective general purpose cauteries that can be obtained.

Before closing, I want to add a word regarding the apparent destruction of the cervix by a malignant growth, and its complete restoration to normal looks and appearance, after the carcinoma was destroyed by the heat. In two of my cases, where the carcinoma involved the cervix, and utero-cervical junction of the uterus, one of the women, Mrs. T., aged 32, and the other, Mrs. D., aged 45, have a complete restoration of the cervix to normal appearance, and they now menstruate normally. The onset of menstruation in Mrs. D., aged 45, was accompanied by agonizing pain. The second month was not so severe, and the third month still less, while the fourth month after her treatment the pain was practically nil. Mrs. T., aged 32, had a complete restoration of the cervix, apparently without scar tissue, after the complete destruction of the carcinoma by the cautery. Menstruation, in her case, was initiated without any disturbance whatever.

ACUTE PERFORATING GASTRIC AND DUODENAL ULCER

A Report of Nine Cases

By WALTER D. WISE, M. D., Baltimore

AFTER so recent and so comprehensive an article as that of Dr. Ellsworth Eliot, Jr.,[1] on this subject, it would not be pertinent or advantageous to again review the literature at this time, because little or nothing could be added. For a full consideration of these grave abdominal conditions, the reader is referred to this article and its bibliography.

The object of this paper is to briefly report a series of nine cases of perforating ulcer occurring in the services of Dr. A. C. Harrison, eight of the number being operated upon by him and one by the writer.

These cases are presented at the risk of boring the experienced surgeon in order to bring them to the attention of the general practitioner, who, as a rule, does not have the opportunity of seeing more than an occasional case, and who, indeed, rarely seems to have considered the possibility of this condition occurring.

When we consider the frequent occurrence of gastric and duodenal ulcer, and then consider that according to Musser, perforation occurred in 28.1 per cent of a series of 1,800 cases, it makes apparent at once the importance of the subject.

Perforations occur in patients of any period of life, from early infancy to extreme old age, being perhaps most frequent in the third decade, and more common in men than women. Perforation, or rather the symptoms of perforation, may be acute, subacute, or chronic, depending upon the size and location of the ulcer. It is said that acute ulcers perforate more frequently near the cardiac end and chronic ulcers near the pylorus. They are more frequent on the anterior wall, both in the stomach and duodenum, are very rare on the lesser curvature, and practically never occur on the greater curvature. Duodenal perforation is probably more common than gastric, contrary to opinions formerly held. Patients suffering with a perforative gastric or duodenal ulcer usually give a history of some type of previous indigestion. This, however, is not an invariable rule, for at times a perforation occurs without premonitory symptoms sufficient to attract the individual's attention. In practically all cases of the acute variety, the suddenness of the onset is one of the most noteworthy points. Pain, which is usually knifelike and almost unbearable, is perhaps the most constant symptom. Vomiting is not constant, but occurs in the majority of cases, and is perhaps next to pain the most important subjective symptom. It is seen more commonly in duodenal than gastric perforations. Shock, which is usually emphasized in textbooks, is the exception rather than the rule, one of our cases (No. 3) having a pulse rate of 64 on admission to the hospital three hours after the perforation.

The objective symptoms — thoracic breathing and rigidity of the abdominal muscles — are most important, and the point of maximum intensity of the muscular resistance is the most reliable guide to the site of the lesion (Eliot). The disappearance of liver dullness is an uncommon symptom and of little value. Dullness in the flanks should be looked for, and if found is a valuable symptom, but not finding it should not have much influence on the diagnosis.

Among the acute abdominal conditions which may be mistaken for ruptured gastric or duodenal perforation are ruptured extra-uterine pregnancy, acute pancreatitis, acute appendicitis, phlegmonous cholecystitis or perforation of the gall-bladder, and pneumonia. In all these conditions except the last, the proper treatment is surgical, so no serious harm can come of mistaking one of them for the other. Because it gives rise so frequently to pain on the right side of the abdomen, ruptured duodenal ulcer is confused with appendicitis more commonly than it is with any other condition. This is because of the course of the fluid from the perforation, which, experiments have shown, first fills the right kidney pouch, then descends along the outer side of the ascending colon to the right iliac region and the pelvis. Both appendicitis and perforative ulcer are usually preceded by a history of indigestion. In both there are onsets of pain with or without vomiting, increased pulse rate, usually temperature and leukocytosis. In perforation, the suddenness of the onset, the epigastric location of the pain, tenderness and rigidity, usually serve to distinguish it.

Prognosis. Petren divides the cases in the series collected by him into those in which the perforation could be sutured and those in which

[1] Ann. Surg., Phila., 1912. April and May.

it could not, with a mortality of 46 per cent in the former and 91 in the latter. The total mortality in 135 cases was 60 per cent. Of the sutured cases operated upon in the first twelve hours, there was a mortality of 34 per cent. Of those operated upon in the second twelve hours, the mortality was 48 per cent. Of 18 cases operated upon after twenty-four hours, the mortality was 72 per cent. Of the eleven cases reported in his book on duodenal ulcer, Mr. Moynihan had eight recoveries and three deaths, a mortality of 27 per cent.

Treatment. The treatment is, of course, entirely surgical and should be instituted as soon as possible in all cases. As soon as it is decided to operate, the patient is given a hypodermic of a quarter of a grain of morphia and a hundred and fiftieth of atropine. Everything possible to shorten the time of the operation is done. The anæsthetic should be as short as possible and administered by the most skilled man available. The abdomen is prepared by painting it with iodine. The incision is made through the right rectus muscle as for a gastro-enterostomy. In a case such as the last one quoted in this paper, where it is difficult to decide whether the condition is due to appendicitis or gastric or duodenal perforation, it is a mistake to make a compromise incision. If the evidence seems in favor of an appendicitis, a gridiron incision should be made, and if the trouble turns out to be in the upper zone, which may be promptly recognized as soon as the abdomen is opened, the lower incision has not consumed much time and furnishes an excellent tract for drainage of the cæcal fossa, which is nearly always desirable and usually imperative. The second incision can then be placed so that it will give a proper exposure of the field desired. The perforation having been located, there arises the question of the best method of treating it. It may be excised or simply inverted by a purse string suture and reinforced by another purse string or interrupted sutures. Excision is probably a waste of time, in that it has been satisfactorily shown that closure has the same ultimate effect. We believe that all cases of perforative duodenal and gastric ulcers should be drained. While it is true that cases promptly operated upon have been closed without resultant trouble, it is not wise to depend upon the harmlessness of the stomach or duodenal contents, particularly if the perforation occurs a short time after a meal, which is quite usually the case, as it is well known that these organs contain numerous organisms at this period. While there is a great deal to be said on both sides, it is probably safer not to follow the suturing of the perforation by a gastro-enterostomy unless the repair of the ulcer diminishes the lumen of the pylorus or duodenum to such an extent as to obviously interfere with the passage of food—a rare occurrence, according to Eliot. He points out that the food is liquid when it reaches the duodenum, and also that the duodenum of a cat or dog will resume its caliber after two thirds or three fourths of its lumen has been excised. The chief arguments against performing gastro-enterostomy are the prolongation of the operation and the probable conveyance of infection into fields not already contaminated, including the lesser peritoneal sac.

In our series of nine cases, five were of the duodenum and four of the stomach. The duodenal cases were all of the first portion and on the anterior surface. There were two cases of perforation of the lesser curvature of the stomach, a very unusual percentage. The other two were of the pyloric end, one on the anterior and one on the posterior surface. The ages in seven cases where they were recorded were: 40, 42, 40, 40, 26, 57, 26. Eight of the cases were males and one a female. All of the cases were of the acute variety with a sudden onset. Eight of the nine cases gave a history of dyspepsia. There is no record in the other case.

Patient 1 gave a history of dyspeptic symptoms principally characterized by pain for a year before the attack, and for several months had had vomiting and a tender epigastrium.

Patient No. 2. Dyspepsia for many years, occasionally severe.

Patient No. 3. Pain and indigestion for six months. For eight days previous to perforation he vomited everything he ate.

Patient No. 4. For twenty years has had stomach trouble; constantly for two years.

Patient No. 5. Not known.

Patient No. 6. Indigestion with symptoms of heartburn and vomiting for four years.

Patient No. 7. Acute pain after eating for three years; vomited blood several times.

Patient No. 8. Loss of appetite for one month and during that time had pain after eating.

Patient No. 9. Indigestion of two years' duration.

Pain was present in all nine cases, and wherever mentioned is described as violent. The suddenness of this excruciating pain is one of the characteristic symptoms of this calamity.

Vomiting was present in three cases; absent in two; not mentioned in four. One case gave a history of vomiting blood. In the three cases in which vomiting occurred, two were duodenal, one gastric.

Shock was not a marked feature in any case, but a majority of the patients were not seen for several hours after the perforation.

The diagnosis was correctly made in seven cases. Appendicitis was diagnosed once, and in one instance the diagnosis was stated to be either appendicitis or ruptured duodenal ulcer.

Simple suturing of the perforation was done in five instances; suturing and implantation of an omental flap three times. In none of the cases was the ulcer excised. Gastro-enterostomy immediately was done once; as a secondary operation twice; and gastro-gastrostomy as a secondary operation once.

The complications in this series were: Pneumonia, 2 cases; the cough in one of these cases bursting the incision. Persistent hiccough one case.

The recovered number 7, the deaths 2; giving a mortality of 22 per cent.

CASE 1 (reported from previous paper by Dr. Harrison). Male, aged 40 years. Has been a fairly heavy drinker of alcoholics for a good many years and has been steadily losing weight for a year past. For more than a year he has frequently suffered with pain after eating, and for several months has always had pain and usually vomiting after taking food. He has also had a small area in the epigastrium which was tender on pressure. About one hour after taking a rather full breakfast and while walking on the street, he was suddenly seized with violent pain in the epigastrium which quickly became general and overwhelmed him. When seen eight hours later he presented a typical picture of some intra-abdominal catastrophe. His features were pinched and his body covered with clammy sweat. Pulse 80 to 100, very irregular, small and hard. His abdomen was distended, very tense, tender, and flat to percussion. Immediate operation revealed the abdomen filled with fluid and partially digested food. A large perforation on the lesser curvature of the stomach immediately at the œsophageal junction was found. This was closed with a double layer of silk sutures and an omental graft. Recovery good. About a year later a gastro-jejunostomy was done for recurrence of the ulcer and hæmorrhage. Final recovery complete.

CASE 2 (reported from previous paper by Dr. Harrison). Male, aged 42, with previous history of dyspepsia for many years, but only occasionally severe. August 18, 1905, at 9 A. M., while at work he was suddenly seized with a violent pain in the upper abdomen, more marked in the right side. Seen August 19th at 12 M. Usual picture of peritonitis. Skin dusky, abdomen tense and tender; general symptoms came on rather slowly; right side more tender and muscles harder than on left. Especially tender in right colonic area. Duodenal perforation diagnosed. Immediate operation. Amount of fluid rather small and limited to right side. Small opening in first portion of duodenum. Closed with a double layer of sutures and omental graft. Recovery uneventful. Subsequent health good.

CASE 3. L. K., male, aged 40. Admitted to Mercy Hospital (Dr. Harrison) January 18, 1909. Has had indigestion and some pain in upper part of the abdomen for the past six months. About eight days ago he became much nauseated and vomited everything he ate, not being able to retain anything at all. This was accompanied by considerable pain. Yesterday morning his pain became very severe and has continued so. About noon to-day he had a violent pain and at that time sent for Dr. Harrison who diagnosed a ruptured duodenal ulcer and sent him to the hospital. Upon arrival at the hospital examination showed his temperature to be 98, pulse 64, face drawn and pinched; abdomen scaphoid and extremely rigid all over. Palpation revealed tenderness to be general but particularly acute over the appendix region and between umbilicus and right costal margin. Operation was performed at 5:30 P. M. Incision made over duodenal region and abdomen found to contain a moderate amount of fluid. A perforation about the size of an ordinary lead pencil was found on the anterior surface of the first part of the duodenum. This was closed by a purse string of black linen and reinforced by two layers of Lembert sutures. The peritoneum and muscle walls closed with catgut, skin with silver wire subcutaneously. A suprapubic opening was then made and a large rubber tube filled with iodoform gauze was inserted with a free gauze drain above it. The upper incision was protected from the drainage by a rubber tissue covering. Patient was put to bed in the Fowler position and given 500 cc. of salt solution subcutaneously. After awakening from the anæsthetic he was nauseated but did not vomit. He drank water rather freely; complained of pain in his abdomen.

January 19th. Patient complained of pain in his abdomen and chest. Examination of his chest showed considerable bronchitis. Abdomen soft.

January 20th. Abdomen soft and pressure caused no pain. No vomiting; drinks plenty of water. Complains of great pain in chest. Left lower lobe completely consolidated. Bowels moved freely. Prescribed eggnog: takes it well.

January 21st. Looks badly; much air hunger, cyanosed; pain in chest; much expectoration; constant cough of distressing type.

January 22d. No change.

January 24th. Seems to feel slightly better. Slept well. Wounds dressed. Gauze drains removed. Rubber tube left in.

January 27th. Upper wound found to be pulled open and omentum protruding and adherent to dressings. Wound resutured.

January 28th. Lungs somewhat clearer. Seems more comfortable.

February 1st. After January 28th patient's temperature never rose above 99, but his pulse was high and he grew weaker and weaker, finally dying to-day.

CASE 4. Mrs. C. F. W., aged 40. Admitted to Mercy Hospital (Dr. Harrison) August 20, 1910. For twenty years has suffered more or less constantly with "stomach trouble," having numerous attacks of pain, being at times unable to eat on account of the pain. About twelve years ago lavage and medicinal treatment were tried but without much success. For past two years has had constant indigestion and has lost considerable weight. At 6:30 P. M., August 20th, she was taken with a violent pain in the epigastrium and was promptly seen by a neighboring physician who administered a hypodermic of morphia which failed to give relief. Dr. Harrison was then called and diagnosed a perforation of the stomach or duodenum and hurried the patient to the hospital. Operation revealed a stomach divided into two unequal parts connected by an hour-glass contraction, the cardiac pouch being about the size of a large pear, the pyloric side being a little larger in calibre than the duodenum. These two pouches communicated by a canal not larger than the little finger. On the upper edge of the most contracted portion there was a small perforation surrounded by an area of brawny

induration, evidently the base of a long standing ulcer. An oblique incision was made from the perforated point into the proximal and distal pouches and the opening closed as in a pyloroplasty, the ulcer area being inverted. The subsequent course of the case was fairly smooth, and though after her operative recovery she was able to take food with less discomfort than formerly, she continued to have marked gastric disturbance. At a subsequent operation, many dense adhesions were found between the anterior gastric and parietal walls, and after sufficient dissection of these a gastro-gastrostomy was performed after the method of Moynihan. Since this operation the patient's general health has been fairly good, but her digestion is not normal.

CASE 5. This history has unfortunately been lost in some manner. The patient was admitted to St. Joseph's Hospital in the winter of 1910–11 with symptoms of a violent abdominal catastrophe which were thought to be due to appendicitis, but at operation were found to be due to duodenal perforation. A gridiron incision was made first — later a right rectus. He made a good operative recovery but some months later returned with persistent gastric symptoms for which a gastro-jejunostomy was performed. He again made a good operative recovery, but his subsequent history is not known.

CASE 6. S. L., referred by Dr. Savage. Admitted to Mercy Hospital September 7, 1911. Operated upon by Dr. Harrison. Patient was seen September 1st by Dr. Savage and gave a history of indigestion of four years' standing. He suffered with heartburn and vomiting, vomiting ten to fifteen times after eating. Three months previously he had been in a hospital in New York and treated for gastric ulcer. On September 7th he felt badly and to get relief took *five* seidlitz powders at one time. He immediately had a violent pain and upon calling his physician was sent directly to the hospital. With this history the diagnosis was pretty clear. Operation showed the peritoneum to be soiled by the yellow fluid usually found in these cases and a perforation of moderate size was located on the front of the duodenum. This was closed by a purse string suture of linen reinforced by Lembert-sutures and a gastro-enterostomy was done. The patient went to bed in moderately good condition and never had any signs of abdominal trouble, but developed a severe and persistent hiccough which no medicines or measures would control, dying on the third day apparently from exhaustion.

CASE 7. H. N., aged 26. Admitted to St. Joseph's Hospital September 10, 1911. Operated upon by Dr. Harrison. For over three years patient has had acute pains in epigastrium which would come on about a half hour after eating. He has had some trouble with gaseous eructations and several times has vomited blood. At times he has passed blood in his stools. He has had a good appetite but did not eat on account of the distress caused by food. For the past two or three days he has felt quite ill but has continued at work. This afternoon he felt a severe pain in his abdomen, which so rapidly grew worse that he had to be taken home from his work. He was then sent to the hospital and on admission had all the symptoms of peritonitis. He was infused with 500 cc. of salt solution and immediately operated upon. When the peritoneal cavity was opened a large quantity of fluid escaped. The stomach was inspected and immediately at the pylorus on the posterior surface a small indurated area existed, the center of which had perforated. The perforation was closed by a purse string suture of linen and further strengthened by a second of the same kind. Four cigarette drains were inserted, thoroughly draining this area. A counter opening (McBurney) was made over the appendix and through this three cigarette drains were inserted.

September 28th. Drains have been gradually loosened at each dressing; last drain removed to-day. Patient is eating solid food without any discomfort. For first few days he complained of a burning pain in the stomach which was relieved by small doses of sodium bicarbonate.

October 18th. Patient eating all foods without trouble. Wounds entirely healed. Left hospital to-day.

CASE 8. L. S., age 57. Admitted to Mercy Hospital (Dr. Harrison.) March 30, 1912. Patient never had any digestive disturbance until a month ago when he lost appetite and noticed pain in his stomach after eating. Says it seemed as though the food would not pass through his stomach as it should. Had no vomiting. Bowels normal. Passed no blood that he knows of. On March 30th at 4:30 P. M. he noticed a pain in his stomach, but took a little whiskey and kept on at work. At 7 P. M. he had to stop work and sit down. At 7:30 he had such a severe pain he fell to the floor. He was brought to the hospital in an ambulance and operated on at 11 P. M. A perforation was found just to the stomach side of the pylorus. It was closed by a purse string and two Lembert sutures. Drainage at the site of the ulcer and through to right-sided gridiron counter opening. His temperature never rose above 100.4° and was normal after the first week. He was discharged April 27th.

CASE 9. G. T., aged 26. Admitted to Mercy Hospital June 2, 1912. (Operated upon by the writer.) He had had indigestion for about two years but gave no history of vomiting or hæmatemesis. At 6:45 P. M. on the day of admission, immediately after eating his supper, he was seized with a violent pain. He was not seen, however, by his family physician, Dr. B. McCleary, until 10 P. M. Upon his arrival at the hospital, he presented all the appearances of some intra-abdominal catastrophe and immediate operation was proceeded with. He was complaining of great pain in the abdomen and made an outcry upon the gentlest palpation. The abdomen was very rigid, apparently more so in the upper zone. He had no vomiting. His temperature was 98.8°; pulse 128, respiration 36, and though it was surmised and stated that a duodenal perforation was the most probable condition, this was not entirely clear, and it seemed wise to make a compromise incision so that all parts of the abdomen could be inspected for diagnostic purposes. Upon opening the abdomen a moderate amount of free fluid was encountered. The appendix was inspected and at first was thought to account for the trouble; but upon freeing it, it was seen that this was not the case. The stomach and duodenum were then exposed and when this area was invaded considerably more free fluid was found. On the front of the first part of the duodenum there was a perforation about the size of a small lead pencil. This was closed by a purse string of linen, reinforced by Lembert sutures and a piece of omentum which was at hand was sewn over the ulcer site. The lumen of the duodenum did not seem to be encroached upon to any serious extent by the repair. Cigarette drains were placed in the duodenal and right iliac regions. The patient's pulse remained fast for several days and on the third day he developed a broncho-pneumonia, but held his own very well and gradually improved. The wound broke down quite a good deal, making his convalescence slow, but on July 27th he was discharged perfectly well and able to eat regular diet.

FURTHER REPORT OF CASES OF DYSMENORRHEA RELIEVED BY NASAL TREATMENT[1]

By JOSEPH BRETTAUER, M. D., New York City

At the meeting of this society held in May, 1911, when I called attention to the "Nasal Treatment of Obstinate Cases of Dysmenorrhea",[2] I had had a very limited experience with this form of therapy. I was prompted to report the few cases which I had observed, only because the results were of such an astounding character. I could not at that time form an opinion as to the value of the treatment, as far as permanent results were concerned.

Since then a larger number of cases have been treated and kept under observation for periods ranging from three years to several months. I feel, therefore, that I am not only justified, but that it is my duty to report to you the histories of these cases in detail.

The cases observed number 66 in all and the results have been so favorable that the nasal treatment of certain forms of dysmenorrhea appears to be an extremely valuable adjunct to the methods heretofore employed for the relief of menstrual pain. Of these 66 cases, 33 were immediately benefited; that is to say, the first period following treatment was painless; 17 were immediately improved, the former suffering being greatly diminished; 15 were not relieved at all.

On April 1, 1913, I made an effort to communicate with all patients treated since April, 1910; in 18 instances no report could be obtained. Twenty-two patients report that they are absolutely cured; some of these belong to the early series treated in 1910 and early in 1911, giving a history of from 12 to 24 months of absolute relief. Seven of the older cases reported a vast improvement, and only five, in addition to the fifteen which were not relieved immediately, reported no benefit.

Considering, then, that in over half the patients treated we were able to afford immediate relief, and that permanent relief was obtained in about one third, doubt as to the value of the treatment is impossible.

As far as the class of cases is concerned, I would say that they are young women, both married and single, for whom all the recognized means for the relief of dysmenorrhea had been previously employed, in some cases by me, but in the majority of instances by others, and whose pelvic organs presented no organic lesion. It would occupy too much time and space if I were to go into a closer analysis of the material from which these cases are drawn and those interested will find in the appended table all the desired information.

Of the many symptoms complained of, both previous to and during menstruation, one group stands out prominently; those characterized by premenstrual headache and nausea, and menstrual colic after the onset of the flow.

In looking over my reports, I find that in most instances it is just this symptom complex which is promptly relieved. A few of these cases require special mention.

Case 1. A young woman who had been dilated and curetted twice without relief. She was immediately relieved by three cauterizations and reports that the relief lasted about one year. Although she suffers somewhat at present, she is infinitely better than she was three years ago.

Case 2. Relief was immediate. With the assistance of an occasional cauterization, she remains perfectly well.

Case 11. Has been married eight years, never pregnant. She suffered intensely before and until the menstrual flow was established. She had been operated upon four times without relief. There was a deviation of the cartilaginous septum of the nose, which was corrected by resection on October 17, 1911. The sensitive spots were cauterized at the same time. On October 29th menstruation was absolutely painless and remained so until she became pregnant. She was normally confined in November, 1912, and reports on April 1, 1913, that she is nursing her child and is in perfect health.

Case 20. This patient had been curetted several times. She had been advised to have a hysterectomy performed for the relief of her suffering. There was no local lesion. She was completely relieved after three applications and reports a permanent cure on April 1, 1913, fifteen months after the first application was made.

One fact deserves mention, although it may or may not have any connection with the subject under discussion. In addition to Case 11, there were three other cases observed of nulliparous women who conceived shortly after their menstrual suffering ceased. One aborted at the third month; the others are now in the second half of pregnancy.

It has already been stated that practically none of the cases presented any pelvic lesions. Several, however, had pathological conditions in the nose, the correction of which was followed by immediate relief.

[2] Am. J. Obst., N. Y., 1911, lxiv, No. 2

[1] Read before the American Gynecological Association, Washington, D. C., May 7, 1913.

Accurate observations have shown that the areas in the nose (the anterior half of the lower turbinates and the tuberculum of the septum), which Fliess called "Genitalstellen," are invariably swollen, more prominent, bleed more readily upon slight touch, and are exceedingly hyperæsthetic preceding and during menstruation. Normally, all of these characteristics disappear with the termination of the menstrual period. With the exception of the few cases in which a distinctly pathological condition was found in the nose, the characteristic menstrual appearance of the sensitive spots was apparent during the intermenstrual period to a greater or less degree. This fact allowed Dr. Emil Mayer, who, as stated in my first report, has exclusively done the nasal part of the work, to correctly forecast a favorable result in those cases in which this appearance of the sensitive spots persisted.

While in our early series we employed the so-called cocaine experiment exclusively, and only followed its positive reaction with the cauterization of the sensitive spots by actual cautery, galvano-cautery, or trichloracetic acid, we have for over a year entirely discarded this experimental feature of the treatment and employed cauterization by trichloracetic acid alone. It was found best to cauterize at intervals of from three to seven days during one intermenstrual period. In some cases this had to be repeated during one or two successive intermenstrual periods. The application of trichloracetic acid is somewhat painful and an application of five per cent cocaine to the sensitive spots is made prior to the cauterization.

Since the appearance of Fliess' monograph, in 1897, this subject has received a great deal of attention. Publications appeared by Siegmund, Schiff, Koblanck, Seifert, and many others. The verdict was unanimous regarding the value of nasal treatment in certain forms of dysmenorrhea.

Controversies arose, however, when an explanation based on anatomical and physiological facts was attempted. The theory of suggestion was at once rejected by those who had gained a larger experience in employing the treatment. It seems to me, however, that in some few instances, suggestion is of some assistance. A general anæsthetic effect of cocaine was held responsible by some for the result. This was easily disproved, and judging from our own experience, it plays no rôle whatever. In the last half of the series, we have not employed the cocaine experiment at all.

Fliess[1] made an attempt to explain the connection between the genital spots in the nose with the genital organs, by means of Head's segmentation theory. This theory was supported by Siegmund.[2] Seifert, however, in a recent publication,[3] refused, after careful analysis, to accept this explanation. It would entail an undue prolongation of this paper were I to quote the different theories advanced by many authors, which Seifert mentions. One fact, however, stands out clearly: no direct anatomical connection has as yet been demonstrated between the genital spots in the nose and the genital organs.

In conclusion, I wish to say, after an experience with this form of treatment covering a period of over three years, that I consider it of great value and one which should be resorted to in all cases of dysmenorrhea where pelvic disease is absent.

REPORT OF CASES

CASE 1. M. L., age 23, single. April 13, 1910. Symptoms: Excruciating pain for ten days each month; obliged to go to bed and to use hypodermics or sedatives. 1905, dilated and curetted without relief. Treatment: Cocaine applied three times a day at onset of menstruation and during same. Pain severe for three days. May 6, galvano-cautery; May 15, cautery again. June 15, menstruation without pain. Immediate result: December 9, 1910, reports no further recurrence of pain with menstruation. Final result: Temporary relief. April 1, 1913, relief lasted over one year; suffers at present, but not so severely as before. Has not been treated again.

CASE 2. C. S., age 24, single. October 12, 1910. Symptoms: Dysmenorrhea very severe; severe headaches and nausea one week before and first two days, severe bearing down pains with nausea and headache. Has had enchondrosis of right septum and both inferior turbinates are swollen. Treatment: Daily application of cocaine to nose one week before menstruation; no preliminary disturbance. Menstruated without pain; never menstruated so easily. October 29, removed large spur and part of left inferior turbinate. November 13, menstruation without premonitory nausea or headache and without pain. Remained entirely well for seven months, when nausea returned with menstruation. Cautery to sensitive spots. Immediate result: November 11, 1911, has had no pain or discomfort since last note; cured. Final result: Improvement only temporary; requires application of trichloracetic acid from time to time, which affords complete relief.

CASE 3. A. K., age 25, single. October 5, 1910. Symptoms: Codeine was necessary for several years to control nausea and headache. Two large enchondroses of the nasal septum. Treatment: Removal of the septal spurs; cautery to the sensitive spots. Immediate result: Cured. Final result: April 1, 1913, permanent cure.

CASE 4. H. N. B., age 22, single. February 20, 1911. Symptoms: Dysmenorrhea very marked, pain beginning one hour after flow; lasts 24 to 36 hours. Treatment: Cocaine applied to sensitive spots at onset of menstruation

[1] Beziehungen zwischen Nase und weiblichen Geschlechtsorganen. Leipzig. 1897, Halle. 1910.

[2] Ztschr. f. Geburtsh. u. Gynäk., 1908.

[3] Ztschr. f. Laryngol., vol. v, No. 3.

with considerable relief. Immediate result: Improved. Final result: No report.

CASE 5. R. A., age 24, married. March 27, 1911. Symptoms: Severe pain and vomiting first day. Treatment: Treated with cocaine to sensitive spots for two days in advance. Immediate result: No further discomfort. Final result: April 1, 1913, cured.

CASE 6. B. L., age 39, married. April 29, 1911. Symptoms: Very severe pain for four days previous to and severe bearing down pain during menstruation. Treatment: May 1-2, large spurs removed. Galvano-cautery to both sides. Immediate result: May 20, free menstruation with slight pain, never severe. June 14, no pain at all. Final result: 1912, relief only temporary.

CASE 7. B. S., age 28, married. May 13, 1911. Symptoms: Severe pain at time of menstruation. Vicarious nose-bleed. Treatment: Galvano-cautery applied to sensitive areas. Immediate result: February 9, 1912, reports complete cure. Final result: No report.

CASE 8. R. F., age 28, married. June 5, 1911. Symptoms: Pain on right side one week before and first day only. Treatment: June 23 and 27, cautery. A portion of right inferior turbinate was also removed. Immediate result: September 6, reports no relief whatever.

CASE 9. S. S., age 23, married. July 11, 1911. Symptoms: Pain so severe that she is obliged to remain in bed first day and requires hypnotics. Two operations without relief. Treatment: Cautery to sensitive spots, July 11 and 18. Immediate result: August 31, reports absolute freedom from pain. Final result: Patient has left city; no further report.

CASE 10. R. G., age 25, single. October 14, 1911. Symptoms: Has pain ten days before each period; lasts all night of first day. Treatment: Cautery to sensitive spots. Immediate result: Reports no pain. Final result: Doubtful.

CASE 11. M. H., age 28, married. October 16, 1911. Symptoms: Married eight years; no children. Intense colicky pain immediately before and until menstruation begins. Last menstruation September 26. Has been operated upon four times without relief. Has deviation of cartilaginous septum to the left. Treatment: October 17, resection. Cautery applied to sensitive spots. October 29, menstruated without pain for the first time in eight years. Immediate result: November 20, 1911, has menstruated regularly since last report; has had no pain whatever. June 17, reports that she is five months pregnant. Normal confinement, November, 1912. Final result: Nursing her child.

CASE 12. B. L., age 21, married. October 20, 1911. Symptoms: Severe pain for twelve hours before and two days during menstruation. Treatment: Cautery applied, October 20 and November 8. Immediate result: No improvement.

CASE 13. A. S., age 24, married. October 23, 1911. Symptoms: Severe dysmenorrhea. Treatment: Cautery applied. Immediate result: Decided diminution of pain at next menstruation. Final result: Cured, April 1, 1913.

CASE 14. A. M., age 26, married. October 30, 1911. Symptoms: Dysmenorrhea one week before and five days during menstruation. Treatment: November 12, cautery; severe epistaxis followed. November 25, menstruation. Immediate result: No relief whatever.

CASE 15. E. R., age 17, single. November 1, 1911. (R. F.) Symptoms: Severe pain first two days; must go to bed; irregular. Treatment: Cautery applied to sensitive spots. December 27, menstruation, no pain. Immediate result: Has been well; cured. Final result: Cured, April 1, 1913.

CASE 16. I. M., age 15, single. November 1, 1911. (R. F.) Symptoms: Very severe pain 2-3 days before and entire period of three days of menstruation. Treatment: Trichloracetic acid applied. November 1, no pain. December 5 and January 2, trichloracetic acid again applied. Immediate result: No more pain. Final result: April 1, 1913, cured.

CASE 17. S. R., age 27, married. November 1, 1911. (R. F.) Treatment: Electro-cautery. Immediate result: No improvement.

CASE 18. L. M., age 38, single. November 23, 1911. Symptoms: Bearing down pain ten days before menstruation, ceases two days before and is very severe during flow. Treatment: November 23, November 28, December 8, galvano-cautery. December 9, menstruated without pain. December 21, 28, trichloracetic acid applied. Immediate result: Temporary relief. Final result: Not benefited.

CASE 19. R. G., age 23, single. December 6, 1911. Symptoms: Constant pain in abdomen; worse for two days during menstruation. Treatment: Cautery applied once. Immediate result: Not benefited.

CASE 20. M. W., age 21, single. December 22, 1911. Symptoms: Pain on both sides two days before menstruation, lasting three days after. Faints from pain. Curetted three times; hysterectomy recommended. No local lesion except a post-parametritis. Treatment: Trichloracetic acid applied on December 22. December 26, next menstruation absolutely without pain. Two more applications. Immediate result: June 27, 1912, no return of pain since last treatment six months ago. Final result: April 1, 1913, cured.

CASE 21. M. B., age 37, married. January 5, 1912. Symptoms: Severe pain first day; lasts during entire menstruation. Nullipara. Ventrofixation; recurrence of retroflexion. Treatment: Trichloracetic acid applied. Immediate result: Cured.

CASE 22. E. McR., age 23, single. January 10, 1912. Symptoms: Four hours after menstruation begins and continuing for five hours there is extreme suffering. Treatment: Daily cocaine applications failed to relieve. Trichloracetic acid applied three times. Immediate result: No benefit.

CASE 23. B. S., age 31, married. January 15, 1912. Symptoms: Has facial neuralgia on second day of menses. Two weeks later pain over right facial nerve; is completely incapacitated. Treatment: Trichloracetic acid applied. January 17, menses lasting three days, no pain. January 20, 29, trichloracetic acid again applied. Immediate result: Improved. Final result: No report.

CASE 24. F. A., age 27, married. January 23, 1912. Symptoms: Severe pain in mammary glands two weeks before menstruation. Treatment: Three applications of trichloracetic acid. Immediate result: January 26, pain in mammary glands. Final result: No benefit.

CASE 25. R. B., age 21, married. February 16, 1912. Symptoms: Pain first and second day. Treatment: Two applications of trichloracetic acid. Immediate result: No pain at next period.

CASE 26. J. P., age 24, married. February 28, 1912. Symptoms: Pain first day, worse on second day. Treatment: Four applications of trichloracetic acid. June 20, three applications of trichloracetic acid. Immediate result: Relief at some periods and none at others. Final result: April 14, 1913, not relieved.

CASE 27. F. H., age 30, single. March 23, 1912. Symptoms: Pain severe first day, growing gradually worse; compelled to remain in bed 3-4 days each month. Treatment: Trichloracetic acid applied three times. April 3, slight pain for two days, none after that. Four

more applications in April. May 2, feels much easier; rested in bed, but could read and take food. No severe pain. May 27, no cramps at all, felt comfortable during whole period. Immediate result: Greatly improved. Final result: April, 1913, improved.

CASE 28. E. F. R., age 26, single. April 24, 1912. Symptoms: Constant pain on right side; begins day before menstruation, lasts two days. Treatment: Three applications of trichloracetic acid. Much improved at next menstruation; one following associated with some pain. Immediate result: Greatly improved. Final result: No report.

CASE 29. A. B., age 28, married. April 4, 1912. Symptoms: Severe cramps first day, has to go to bed; is due to menstruate tomorrow. Treatment: Cocaine application followed by immediate relief. A single application of trichloracetic acid made the following day. Immediate result: July 12, reports that she has been in splendid condition; has had no cramps and very little tired feeling. Final result: April 1, 1913, cured.

CASE 30. A. M., age 29, married. April 15, 1912. Symptoms: Headache prior to menstruation; severe backache during entire period. Treatment: Only two applications could be given as the patient left the city. Immediate result: No relief.

CASE 31. E. G., age 30, married. April 13, 1912. Symptoms: Severe headache one week before and severe cramps first and third day. Treatment: Three applications of trichloracetic acid; no improvement at next menstruation. Three more applications with no improvement. Immediate result: No benefit.

CASE 32. F. S., age 32, married. April 16, 1912. Symptoms: Severe pain five days before and again for one day six days later. Treatment: Three applications of trichloracetic acid; pain at next period not so severe as usual; two more applications. Immediate result: August 28, cessation of all pain during past three months. Final result: April 1, 1913, cured.

CASE 33. M. C., age 38, single. April 17, 1912. Symptoms: Severe headache and nausea at menstruation. Treatment: Four applications of trichloracetic acid. Immediate result: No benefit.

CASE 34. P. F., age 28, single. April 24, 1912. Symptoms: Irregular menstruation; severe cramps and headache. Chills 2-3 days before. Treatment: Three applications of trichloracetic acid. May 23, no chills, and pain for only one half day before. Immediate result: No further chills; pain so slight as not to interfere with daily work. Final result: April 1, 1913, cured.

CASE 35. F. S., age 24, married, sterile. April 29, 1911. Symptoms: Pain one week before and first day, flow very scant. Treatment: Four applications of trichloracetic acid in April and May. May 22, no abdominal pain, slight headache. Immediate result: September, 1912, has had no further discomfort and is now two weeks overdue. December, 1912, has been well since last note. Final result: Cured. Aborted at third month.

CASE 36. F. K., age 30, married. May 1, 1912. Symptoms: Constant pain in abdomen; worse on right side. Severe pain 3-4 days before menstruation. Treatment: Four applications of trichloracetic acid in May, resulting in relief from pain; the following month, no treatment, and pain as before. Immediate result: Temporary improvement.

CASE 37. S. F., age 33, married. One child eight years of age. May 3, 1912. Symptoms: Very severe pain and vomiting each month. Treatment: Three applications of trichloracetic acid. Immediate result: August, 1912, reports absolute cessation of pain and no vomiting for the past three months. Final result: April 1, 1913, cured.

CASE 38. E. L. S., age 29, married, bipara. May 3, 1912. Symptoms: Severe pain for twelve hours on first day. Treatment: On evening of first day of menstruation cocaine applied to sensitive spots with immediate relief of pain; application repeated on following morning. Immediate result: June, 1912, menstruated without pain. Final result: April 1, 1913, cured.

CASE 39. S. L., age 24, single. May 13, 1912. Symptoms: Excruciating pain on first day. Treatment: Trichloracetic acid applied. Immediate result: Improved. Final result: April 1, 1913, cured.

CASE 40. S. S., age 24, married. May 23, 1912. Symptoms: Pain for short time before menstruation; lasts 3-4 days; codeine required for its relief. Treatment: Four applications of trichloracetic acid prior to next menstrual period. Immediate result: No relief.

CASE 41. J. S., age 28, married. May 27, 1912. Symptoms: Cramps one week before; very severe the first day. Treatment: Cocaine applied at once as she is about to menstruate; also following morning and evening. Immediate result: No pain first day as formerly. Final result: Not benefited.

CASE 42. M. K., age 19, single. June 8, 1912. Symptoms: Severe cramps and headache one week before. Treatment: Trichloracetic acid June 8, 11, 14. July 2, menses appeared one week late; no premonitory pain and no pain whatever during the whole period; first time in years that she has been free from pain. Flow greater than before. Immediate result: August 1, 1912, menstruated on time; no preceding pain; some headache on second day; no further discomfort. November 1, 1912, cured. Final result: April 1, 1913, cured.

CASE 43. M. N., age 37, married. June 10, 1912. Symptoms: Constant pain in bladder and all over abdomen; severe cramps, worse on first and second days. Treatment: Four applications of trichloracetic acid; failed to relieve. Immediate result: No benefit.

CASE 44. F. S., age 25, single. July 11, 1912. Symptoms: Severe pain; has to remain in bed for three days; requires sedatives. Has had two operations without benefit. Treatment: Cocaine applied at midnight of first day and again the following morning; no relief. Immediate result: No benefit.

CASE 45. F. B., age 26, married. September 7, 1912. Symptoms: Severe pain on first day. Treatment: September 14, 20, 27, applications of trichloracetic acid. Immediate result: Pain not so severe on first day; improved.

CASE 46. S. L., age 31, married. September 9, 1912. Symptoms: Severe cramps one week before; worse on first and second day; menstruation has always been very painful. Has cramps now, expects to be unwell September 10. Treatment: Cocaine applied, followed by trichloracetic acid. Immediate result: Unwell September 15, without premonitory pain. Cured.

CASE 47. R. D., age 29, married. September 17, 1912. Symptoms: Constant pain in lower abdomen; severe 2-3 days before menstruation, becoming worse first two days. Treatment: Trichloracetic acid September 17, 20, 24, 27. Immediate result: Cured; no pain and very slight disturbance at menstruation. Final result: April 1, 1913, relief only temporary.

CASE 48. E. H., age 19, single. Sept. 19, 1912. Symptoms: Very severe pain one day before and 2-3 days during menstruation. Treatment: September 19, 23, 27, trichloracetic acid. Immediate result: No relief.

CASE 49. E. S., age 28, married. September 24, 1912. (R. F.) Symptoms: Cramps eight days before, becoming

extreme after flow is established. Treatment: September 24, 28, October 1, trichloracetic acid. Immediate result: October 8, no cramps; four days overdue. Cured. Final result: April 1, 1913, pregnant three months.

Case 50. R. S., age 27, single. October 12, 1912. Symptoms: Severe pain for four or five days; has had pain occur ten days after; always has pain after flow is over. Treatment: October 12, 17, 22, trichloracetic acid. Immediate result: Greatly improved.

Case 51. E. L., age 31, single. October 14, 1912. Symptoms: Severe cramps one week before and first day; headache, nausea, vomiting for 24 hours; flooding for two months. Fibroid in anterior wall of uterus. Treatment: October 14, 19, 24, 29, trichloracetic acid. Immediate result: Flow diminished, otherwise no improvement. Final result: April 1, 1913, no benefit.

Case 52. M. B., age 20, married. October 26, 1912. (R. F.) Symptoms: Severe pain second and third day. Operation gave no relief. Treatment: October 26, 30, November 4, 11, trichloracetic acid. Immediate result: Cured.

Case 53. C. C., age 27, single. October 26, 1912. Symptoms: General depression before; very severe pain first and second day. Treatment: October 26, 30, November 4, 8, trichloracetic acid. Immediate result: Cured. Final result: April 1, 1913, cured.

Case 54. D. H., age 22, married. November 7, 1912. (R. F.) Symptoms: Pain first day; due to-day. Treatment: Daily applications of cocaine (6). Immediate result: No menstruation; pregnant. Final result: April 1, 1913, pregnant four months.

Case 55. F. G., age 34, married. November 15, 1912. Symptoms: Menstruates for one day only; severe headache for four days before and during and after menstruation. Treatment: November 15, 20, 25, 30, trichloracetic acid. Immediate result: Flow lasted three days; no premonitory symptoms; no pain. Cured.

Case 56. S. H., age 22, married. November 18, 1912. Symptoms: Pain in back almost constant; worse before menstruation. Treatment: November 15, 20, 25, 30, trichloracetic acid. Immediate result: Much less discomfort after first two treatments. Final result: April 1, 1913, improved.

Case 57. H. L., age 41, married. November 25, 1912. Symptoms: Severe headache and nausea four days before; requires morphine. Treatment: November 25, 30, December 3, 9, 19, 23, January 2, trichloracetic acid. Immediate result: Some headache and nausea, but not severe. Final result: April 1, 1913, no headaches for three periods; cured.

Case 58. D. W., age 26, single. December 5, 1912. Symptoms: Headaches two days before; nausea and cramps. Treatment: December 5, 10, 16, trichloracetic acid. Immediate result: Ill in bed with general malaise. No headache, nausea, or cramps. Cured. Final result: April 1, 1913, improved.

Case 59. S. G., age 24, married. December 12, 1912. Symptoms: Severe pain during whole period. Treatment: December 12, 17, 23, 28, trichloracetic acid. Immediate result: Greatly relieved.

Case 60. F. M., age 24, married. December 13, 1912. Symptoms: Pain very severe before and lasting 3–4 days. Constant pain for the past year; nausea and fainting. Treatment: December 12, 17, 23, 28, trichloracetic acid. Final result: April 1, 1913, no benefit.

Case 61. B. M., age 19, single. December 28, 1912. Symptoms: Menstruation tri-monthly, pain one to two weeks before and during; last menstruation four weeks ago. Treatment: December 28, January 4, 11, 16, 23, trichloracetic acid. Immediate result: Menstruated on time two days after first application; no pain for the first time in her life. Cured. Final result: April 1, 1913, menstruated in February and March without pain.

Case 62. J. M., age 28, married. January 8, 1913. Symptoms: Severe pain first day; headache day before. Treatment: January 8, 13, 18, 23, trichloracetic acid. Immediate result: Cured.

Case 63. S. H., age 29, married. February 3, 1913. Symptoms: Constant pain in right iliac fossa; very severe two weeks before menstruation. Treatment: Three applications of trichloracetic acid. Immediate result: No relief.

Case 64. E. D., age 43, single. February 25, 1913. Symptoms: Nausea and vomiting after flow is established and occasional severe headache after cessation. Treatment: Four applications trichloracetic acid between two periods. Immediate result: Only slight nausea after menstruation.

Case 65. R. R., age 30, married. February 28, 1913. Symptoms: Severe pain and nausea two days before. Treatment: Four applications trichloracetic acid between periods. Immediate result: Cured.

Case 66. R. P., age 25, married. March 14, 1913. (R. F.) Symptoms: Severe cramps; suffers greatly first twelve hours. Treatment: Four applications trichloracetic acid between periods. Immediate result: Cured.

UTERINE INERTIA—ITS TREATMENT[1]

By GEORGE TUCKER HARRISON, M. A., M. D., Charlottesville, Virginia

IT frequently happens that in the very beginning of labor a defective power is exhibited by the uterine muscle, and this inefficiency, well named by the older physicians inertia uteri, continues during the whole period of dilatation. This constitutes "primary uterine inertia." The causes may be either in anatomical changes in the uterine muscle or in disturbed innervation.

"Secondary uterine inertia" is that condition which obtains when the contractions, sufficiently strong in the beginning of labor, gradually, later on, diminish in force to a striking degree. The uterine muscle presents a condition of exhaustion or fatigue. In consequence of the demand made upon the uterine muscle, possibly by abnormal obstacles to be overcome, the uterus, unable to

[1] Read before the American Gynecological Society, Washington, D. C., May 6, 1913.

respond, becomes exhausted. It is interesting to note that in some of these cases the secondary uterine inertia—as Hofmeier has shown—is due to the fact that the uterine muscle in overcoming strong resistance is retracted above the fœtus, and a maximum degree of retraction is attained before the head is expelled.

According to my observation, primary uterine inertia is apt to occur in women who have become pregnant for the first time late or near the end of menstrual life. In the simple form of primary inertia, actual intervention is not often indicated: the obstetrician, by words of encouragement inspiring the patient with hope, confidence, and fortitude, may often work wonders. The patient should not be confined to bed, but urged to stand up and walk around the room. The importance of seeing to it that the bladder and rectum are emptied must be borne in mind. It is an egregious error to rupture the bag of membranes prematurely. Its invaluable function in dilating the cervix by hydrostatic pressure is thereby lost, to the detriment of the further course of labor. An exception must be made in the case of an immoderate distention and thinning of the uterine walls, as occurs in hydramnion or twins; then the artificial rupture of the membranes has an excellent effect. When special circumstances make a rapid delivery indicated, as eclamptic attacks, hæmorrhage, decomposition of the uterine contents, etc., active intervention is demanded. Hot water vaginal douches have been recommended highly under these conditions, as, it is maintained, they evoke contractions in a reflex way, and at the same time produce hyperæmia and relaxation of the parts to be dilated. I must earnestly and decidedly deprecate the use of this method of treatment, as it deprives the vagina of its protecting coat of mucus, is liable to produce lesions of the vaginal epithelium, and thus favors septic infection; lastly, other methods are better. A much more effective method is to dilate with the metreurynter Charpentier de Ribes or its modification. If a strong traction is exerted on the rubber bag, the pains become stronger in a short time, the cervix may be gradually dilated, and version and extraction soon effected.

As to how far inertia itself constitutes an indication for active intervention, the views among prominent obstetricians widely differ. Wyder[1] says, "Inertia in the proper sense of the the term is no indication, but rather a contra-indication for a forceps operation, because in that case by chloroform narcosis and quick evacuation of the uterus the defective contraction of the latter, with its consequences, is simply made worse." Tweedy and Wrench,[2] representing the practice at the Rotunda Hospital, Dublin, declare: "To deliver the feeble uterus of a fœtus is good treatment; to deliver an exhausted uterus is treatment which greatly endangers the mother's life, for post-partum hæmorrhage will occur, because the exhausted uterus cannot contract and retract to stop the hæmorrhage." On the contrary, Fritsch[3] expresses the opinion, "that if the parturient woman is too weak and too much exhausted, in order to employ the auxiliary forces effectively and to co-operate with the uterine contractions properly, if danger to the life of the child is diagnosticated, we substitute the defective force from above by the force of traction from below; that is, we apply the forceps."

Let us, therefore, strip the subject of all extraneous matter, and try to get at the essential facts. In the case of primary inertia when the membranes are intact the condition is that which obtains in pregnancy, and consequently delayed labor is not dangerous to mother or child. The most important thing, as a rule, is patience on the part of the attending obstetrician. Even when the membranes have ruptured prematurely, it is not necessary, usually, to actively intervene. After a longer or shorter period of inactivity, labor sets in and progresses favorably, as a rule. In these cases I have found a hypodermic injection of morphia, atropia, and strychnia nitrol, occasionally exhibited, very useful. If the period is too protracted, and there is danger of infection, I believe dilatation by the metreurynter to be indicated, and artificial delivery.

I have never had experience in the use of pituitary extract, but in view of the many facts brought forward showing its valuable properties in stimulating contractions, it would certainly seem to be indicated in primary inertia when dilatation has advanced to a considerable extent. The paper of Dr. Humpstone[4] read before the New York Obstetrical Society is instructive and well worthy of perusal, as well as the remarks of members of the society in the discussion that followed. The experience of such observers as Hofbauer,[5] Robert Stern,[6] Otto Fischer,[7] Bondy,[8] and Herman Schmid[9] point in the same direction: Ergot should never be exhibited until after the

[1] Hand. f. d. Geburtsh., von Winckel, iii, 498.

[2] Rotunda Practical Midwifery, p. 244.

[3] Geburtsh., p. 399.

[4] Am. J. Obst., N. Y., Sept., 1912, p. 357.

[5] Zentralbl. f. Gynäk., 1911, p. 137.

[6] Berl. klin. Wchnschr., 1911.

[7] Zentralbl. f. Gynäk., 1912.

[8] Berl. klin. Wchnschr., Aug. 7, 1911.

[9] Gynäk. Rundschau, 1911.

completion of labor, notwithstanding the fact that it has been recommended by conspicuous authorities. The exhibition of pituitary extract in combination with strychnia, as suggested by Dr. E. P. Davis, is worthy of trial. A point of differential diagnosis should be carefully considered which is to establish the fact whether the case in hand is actually one of primary inertia or simply a case in which labor has not yet begun. In the discussion referred to above, Drs. Coe and Child, respectively, called attention to this point. In the paper of Dr. Ryder[1] read before the New York Obstetrical Society, May 14, 1912, on "Primary Uterine Inertia," the author makes this remarkable statement: "Cæsarean section has a place in primary uterine inertia, and should be seriously considered, even in the absence of obstruction. It is absolutely safe for the fœtus, and is often safer for the mother than a hard forceps operation or a breech extraction." I almost feel inclined to apply to the author the words of Cicero in his speech against Cataline: Quem ad finem sese effrenata jactabit audacia? ("To what limit will unbridled audacity fling itself?") The rage for operative surgery certainly finds its illustration here.

In a considerable private, consulting, and hospital practice, extending over years, I have never seen a case of primary inertia in which a Cæsarean section was indicated, and in which obstetric resources proved inadequate. In the second stage of labor, after the escape of the amniotic fluid, secondary inertia may occur, especially in primiparæ. Here, when labor is prolonged, there is danger to the child. With every pain the uterus becomes smaller, the caliber of all the blood vessels becomes less, a smaller amount of blood circulates, less oxygen is absorbed, more carbonic acid remains in the child, and it dies. How shall we act now in the premises? Shall we wait until the child becomes restless, until its heart's sounds beome exceedingly rapid, to be afterwards followed by retardation, until there is an escape of meconium; or shall we anticipate this condition, and apply forceps, provided the head is well down in the pelvis and resting on the perineum? It must be borne in mind, moreover, that duration of labor and danger of infection stand in direct proportion to each other. In view, therefore, of danger to both mother and child from a protracted labor, at the end of the period of expulsion it is absolutely logical to aid the futile efforts of the parturient woman by the application of the forceps. A note of warning is here in place. The mistake is made now and then by those of limited experience to blame the uterus, when in point of fact it is the auxiliary forces which are at fault. Kerr[2] has recently called attention to this subject. Even when there is no paralysis of the abdominal muscles they may have to act at a mechanical disadvantage. Thus in multiparæ with pendulous abdomens in whom there is a diastasis of the recti, so that there exists a hernia lineæ albæ, a complication which adds much to the difficulties presented by a case of inertia uteri. In these women with pendulous abdomens the overdistended and atrophied muscles are no longer able to effect a potent increase of pressure in the abdomen, and in diastasis of the recti the uterus is forced forward into the wide space between the muscles as soon as the woman makes an attempt to co-operate by bearing down. Under these circumstances it has been recommended by many authorities to call into play the Kristeller (or Bockelmann's modification) method of expression. For my part, I believe it is better in the interests of mother and child to apply the forceps and so end quickly and safely a painful situation. In the description of cases of uterine inertia and the treatment employed I have observed that reference was made to the use of high forceps. It is my firm conviction that when the head is movable above the superior strait that under all circumstances the forceps is contra-indicated, and that, in the interests of mother and child, podalic version followed by extraction is indicated, and is much easier for the obstetrician than high forceps. The principle has been advocated by eminent authorities that in establishing indications à propos of this theme we should regard primarily the life and health of the mother, as the life of the child is not to be estimated as highly as that of the mother. It is the glory of the modern development of obstetrics, however, that it makes its highest problem the endeavor to save the lives of both mother and child; and this placing in opposition their respective interests is much to be deprecated. As undoubtedly hæmorrhage may occur in cases of secondary inertia it is a part of wisdom to be prepared to meet this emergency.

[1] Am. J. Obst., N. Y., 1912, Sept.

[2] Operative Midwifery, 2d ed., p. 9.

TRANSACTIONS OF SOCIETIES

CHICAGO SURGICAL SOCIETY

REGULAR MEETING HELD MARCH 7, 1913, WITH THE PRESIDENT, DR. CHARLES DAVISON, IN THE CHAIR

DR. WILLIAM R. CUBBINS read a report entitled "Compilation of the Methods Used and the Results Obtained by Fellows of the Chicago Surgical Society in Brain Surgery." (See p. 357.)

DISCUSSION

DR. ALLEN B. KANAVEL: Since this report was gathered by Dr. Cubbins I have had one case come under my observation, which is rather interesting, of a patient who was hurt during the Civil War, and following the injury he had what apparently was Jacksonian epilepsy, although I did not get the exact details as to his attacks. These attacks grew in severity for a number of years, when the patient was taken in hand by Dr. Brower. At that time Dr. Brower injected the peripheral nerves. He was injected several times by Dr. Brower without success. Following that, some 25 years after the injury, when he was having almost weekly, if not more frequent attacks, of these convulsions, he was taken in hand by Dr. Parkes, was operated upon and a section of bone was removed from the skull, following which at first the attacks were more frequent, and subsequently they were less frequent. At the end of a year the attacks ceased entirely and he has been practically well ever since. This case is well worth mentioning as showing the results that may be obtained in certain cases.

DR. D. B. PHEMISTER: In giving the mortality of the operated cases in this report, all varieties of malignant tumors were considered together. It seems to me, a distinction should be made between the gliomas and the tumors of mesoblastic origin, since practically none of the former can be successfully removed, while the endotheliomas and sarcomas, if properly localized and exposed, can usually be enucleated.

DR. JACOB FRANK: When I first commenced to do brain work I used interlocking stitches of black and white silk, then I began to use rubber tubing around the head and found this a little more convenient and better; then this was replaced by flat rubber. This was also carried out for a short time; it was much better, as it would not slip.

In listening to the report I did not hear the speaker mention that some do not use any temporary hæmostasis. I have discarded all temporary means of controlling hæmorrhage of the scalp. I simply make a sweep with the scalpel as rapidly as possible down to the bone, and where there are bleeding vessels the assistant with his fingers makes pressure over it on the skull until they are ligated with a mass suture of catgut; this controls the bleeding and relieves the annoyance of a band that is put around the head, which is always slipping. Sometimes we may wish to extend the incision a little lower, and then the tourniquet is in the way, necessitating its removal during the operation, which is very annoying.

I want to thank Dr. Cubbins for continuing this new feature of our society. I think it is one of the good things that our society has undertaken because it brings out the good and profitable points and the work of the individual members and the actual way they are doing their work and from which not we alone are benefited, but all surgeons who read our transactions.

DR. HAROLD N. MOYER: Early in my neurological experience I hesitated to recommend opening the skull unless there were clear indications of cerebral growth and some indication of its location and a fair chance that it could be removed. A longer study has convinced me that it is easy to be too conservative; I now unhesitatingly recommend an exploratory operation in all cases where I suspect a neoplasm is responsible for definite symptoms of increased intracranial tension, and this regardless of its possible nature and in the absence of local symptoms.

It is true that operations for brain tumor are disappointing from a surgical standpoint, even in the small number which can be reached by the surgeon; hardly more than one in ten can be removed, but this does not by any means indicate the value of operation to the patient. I am quite

sure that if I had a brain tumor, I would be very grateful to a surgeon who would open the skull, and if he found that the growth could not be removed, would take away a generous portion of the skull. This relieves pressure, mitigates symptoms, and makes the last days of such an unfortunate far less distressing. For this reason I prefer the large osteoplastic flap angling forward under the temporal muscle. This portion can be removed if the tumor cannot be extirpated.

DR. C. C. ROGERS: I have been very much interested in this paper, and I want to sanction everything Dr. Moyer has said. There is nothing which causes more excruciating and persistent pain, vomiting, etc., than brain tumor or intracranial pressure. Such a patient is about as miserable as you can imagine. If you take off a large plate of skull, open the dura mater, which is necessary in all these cases, you get permanent relief in many cases. You place the scalp back, suture it, and if the patient has a cerebral hernia, it will relieve pressure. The eyes may not improve, so far as choked disc is concerned, which is always present, but the sight they have is maintained; the headache ceases, and in nearly every one of these cases the vomiting likewise ceases. They get relief and some of them live for years.

In regard to controlling hæmorrhage, I make a clean sweep with the knife, as Dr. Frank does, and use a special artery forceps, in that way checking all hæmorrhage. By the time I am through with the operation the hæmorrhage has ceased. I use a Mortel trephine, and have used it for two and a half years.

I demonstrated it before the Chicago Medical Society. I do not think there is a trephine made that will equal the one devised by Mortel. The skull can be opened and a large bone flap turned back, the whole operation not exceeding five minutes. It is an ideal trephine, and as you know time has a good deal to do with our success in brain surgery. I drain the abscess, putting in nothing but iodoform gauze.

There is only one point I would like to emphasize, and that is the statement frequently made, namely, what is the use of operating on brain cases, because they all die? They do not die. It has been my experience that the majority of the cases, if operated on, are improved, and very few of them die from the operation itself. I have never had one die direct from an operation, nor have I seen one die. The results are far better then we are led to believe.

The subject is such a vast one, and so many of the questions have been answered so well in the excellent paper presented to-night, that I need take up no more time. I thank you, Mr. President, for inviting me to discuss this paper.

DR. E. C. RIEBEL: Regarding idiopathic epilepsy, I think it might be well to mention some recent observations of Tilmann by which he was led to believe that some of the intracranial disturbances in this disease are due to a lack of cerebrospinal fluid rather than to an increase; in other words, to the negative pressure rather than to positive pressure. It has been said that collapse of the brain in injuries is a post-mortem sign, and in connection with the statement of Tilmann I recall a case operated on some years ago in which there was collapse of the brain at the time of the operation, although the man presented all the signs of intracranial pressure.

Occipital decompression in basilar skull fractures has been quite interesting to me. I have tried it in two cases, without success; but I think the systematic use of lumbar puncture should be persisted in, in most of the cases of so-called basilar symptoms, whether associated with fracture or not, because the pus pressure that will injure the delicate structures in the posterior fossa may thus be minimized sufficiently to give the medulla and brain a chance to overcome the effects of the primary compression.

I would like to ask Dr. Cubbins if he has received many answers in regard to the decompression operation in basilar skull fractures.

DR. JACOB FRANK: I would like to ask if anybody has made a bacteriological study of the pus from brain abscesses? The reason I ask this question is that within the last year I have had three cases of brain abscess with streptococcus infection in all of them. Where it came from it is impossible to determine. They were deep abscesses in the brain and all the patients died. They all died about the tenth day of meningitis.

DR. ROGER T. VAUGHAN: About a year ago Dr. Halstead had a case of brain abscess in which we found the streptococcus. It came on after a pansinusitis, and owing to the frontal sinus involvement there was a "Pott's puffy tumor" on the forehead. We went in there and found a brain abscess which lay inside the frontal lobe. The patient did not recover, but lived for three or four months after the operation, long enough to go home. Then the abscess filled up again; drainage apparently was not adequate, and there occurred a rupture into the lateral ventricle. The patient was brought back to the hospital, and two or three days later died. At the autopsy this rupture of the large abscess cavity into the ventricle was found. Operation was done about

two months after the pansinusitis began. Dr. Halstead felt that if the patient had remained in the hospital continuously, so that the abscess could have been better watched and freely drained, very likely recovery would have ensued. I have to confess, however, that this case perhaps supports Dr. Frank's contention as to the gloomy prognosis in streptococcus abscess.

DR. CUBBINS (closing the discussion): In answer to Dr. Riebel's question, I will say there were not many men who did the decompression operation in these cases.

With reference to the question of Dr. Frank in regard to brain abscesses, there was not one who said anything about the origin of the brain abscesses except the frequency of those around the middle ear. That was the only point brought out with regard to brain abscesses. There were many other questions that could have been asked, and it would be valuable to have another paper along the line of hæmorrhage into the spinal canal. I know of no one who has made a bacteriological study of the pus from brain abscesses.

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD FRIDAY, MARCH 21, 1913, WITH THE PRESIDENT, DR. RUDOLPH W. HOLMES, IN THE CHAIR

DR. THOMAS J. WATKINS reported cases as follows:

CASE 1. Large fibrocyst of the ovary. The tumor had developed very rapidly so that at the time of removal, three weeks ago, it filled the abdomen and probably contained about eight quarts of serum. Most of the tumor wall is comparatively thin. A considerable hard mass is seen on one side of the wall, which, on section, is a fibroid. The inside of the sac is filled with fibrous-like tissue, which is degenerated fibroid growth. The microscopic examination also shows a few muscle fibers and an absence of lining membrane. A fibrocyst of the ovary is relatively uncommon, especially one of this size. The probable pathology here is that it was originally a fibroid, degeneration occurred in the center, and ascites into the tumor resulted.

CASE 2. Dermoid and adenoma of ovary. This is a dermoid tumor of the ovary with discoloration due to slight hæmorrhages. There is a small bone at one point and a fatty exudate was present in a small area. Sections of the rest of the tumor looked like thyroid gland. It was an adenoma of the ovary with a dermoid in the tumor. There is nothing of any special interest as regards the clinical history.

DR. EMIL RIES: Did I understand Dr. Watkins to say that it was thyroid tissue?

DR. WATKINS: It looked very much like thyroid.

DR. RIES: Did you diagnose a thyroid of the ovary?

DR. WATKINS: No.

DR. RIES: There are some 17 cases recorded in which goiter of the ovary has been described. I had one myself. They are typical thyroids. In the same way that a dermoid of the ovary develops only one tooth, in the same way a dermoid can develop only one organ, and these investigations, starting with Wilms, have come to the point where it becomes a serious question whether we had not better consider a colloid cystoma of the ovary as a small dermoid in which only one pole of it has developed. We can have dermoids which contain not only hair, fat and bones, etc., but in which only one limited organ develops. In many of these cases of dermoid of the ovary, thyroid in combination with other organs have been found. They are like real thyroids. The colloid contained in these glands gives typically the reaction of the colloid in the thyroid in normal persons and in goiter. The case I had was an ovarian tumor larger than a man's head and was filled partly with organized pseudomucin substance, and in its wall was absolutely typical thyroid substance. I think Dr. Watkins has a rare case here, about the eighteenth of its kind.

DR. ARTHUR H. CURTIS: I have seen some of the thyroid tumors of the ovary, and I saw this one. I am inclined to think this is not a thyroid but rather a peculiar type of cyst.

DR. RICHARD R. SMITH, Grand Rapids, presented some photographs and read a paper, "Report of a Case of Intra-uterine Fracture." (See p. 347.)

DISCUSSION

DR. CHARLES R. PADDOCK: I have never seen such a case. Valentine mentions it in his work as something that can happen, and does happen, and I am surprised at the few cases that have been reported. When we stop to think of the accidents that might happen to a pregnant woman — blows striking certain parts of the abdomen and the

child — it seems to me there would be more fractures reported than there are. We frequently find on the abdomen in pregnant women quite a resistance by an arm or leg or even the head itself, and a sudden blow on that part, we would feel, might cause a fracture, and I am surprised. that Dr. Smith has not been able to find more cases in the literature.

DR. RIES: I was reminded by Dr. Smith's case of a case that came up here in the courts, of a woman in one of the hospitals who fell with an elevator, or through the elevator, and fractured the leg of her child. She sued the hospital and it was difficult to determine whether the hospital was responsible for any damage to the child. But the hospital promised to take care of the mother.

DR. J. F. PERCY, Galesburg, Illinois, read a paper, "A Method of Applying Heat Both to Inhibit and Destroy Inoperable Carcinoma." (See p. 371.) Dr. Percy also exhibited water-cooled specula, electric and other cautery irons, etc., devised and used by him in performing his operations.

DISCUSSION

DR. RIES: I have had no experience with Dr. Percy's method and it would not be fair for me to say much about it. I would like to ask Dr. Percy whether he is prepared to give us a list of the number of cases which have been examined in the ordinary way with the microscope, and operated upon, and who have survived the operation five years and are well, so that we can compare the results of this heat-treatment with the results of operative treatment? Or, if the doctor does not claim any cures, if he considers these cases all hopeless anyhow and only tries to relieve them, how long they have lived on an average after treatment — whether he is prepared to give any statement? I think that would help us materially to appreciate his efforts more.

DR. FRANK LYNCH: I think it would be very interesting if we could know the number of years which have elapsed since the treatment, the freedom from pain, etc. Have you any such data?

DR. PERCY: I have used the cautery for two years in this class of cases. My work can be divided into two periods: one in which I did not open the abdomen; and the other, or more recent period, in which I did. In the first period, I operated upon thirteen women. Two of these are now alive — one, four years and six months after a single use of the cautery; and the other, two years after two applications of the cautery with a five months' interval between the applications. Both of these cases were absolutely inoperable by any other method. The time that the other eleven lived is given in my paper in the Journal of the American Medical Association for March 9, 1912. The first of the women just mentioned had her cervix completely destroyed by the carcinoma, and the disease was destroyed by the cautery heat with the result that at the present time she has grown a new cervix that seems normal in every respect. This has occurred also in a more recent case belonging to my second series. In this first period, I was naturally afraid of the bladder and rectum. It was working in the dark. One could never quite know where he was putting the cautery, as far as the bladder, rectum, and ureters were concerned.

In my second series in which I opened the abdomen and applied the cautery, aided by an assistant's fingers in the pelvis, the patients have been relieved of their pain, they have been relieved of the loss of blood and of the stinking discharge, and have apparently locally recovered. I have one woman whom I examined last week, who went the rounds in this city and was seen by five or six of the recognized operators, and none of them would touch her. The consensus of opinion was that she would live longer if left alone. I treated this patient by this method four months ago, and burned a hole in the rectum through the uterus. This discharged fæcal matter through the vagina for six weeks, but that is now entirely closed. She was in the office last week, and there was absolute and perfect healing. There was no evidence of disease in the vagina, and the mucous membrane of the cervix was perfectly movable, and no evidence of bleeding could be developed even by rather rough manipulation of the cervix. This woman had a craterous mass at least two inches in diameter following up along the right broad ligament. She has to-day a mass in the uterus that makes one think of a banana cut in two in the middle. She is rid of the pain down the leg and in the hip, of which she complained so bitterly, and also all her cachexia and all her anæmia. Her hæmoglobin is now 80 per cent. Her appetite has come back and if I have done nothing else, I have given her hope — which is a great deal — and I think I have done a lot more.

You understand we are discussing the absolutely inoperable cases. This was not a case in which the Ries-Wertheim operation could be considered at all — or in the 25 per cent. I am talking about the 75 per cent, and I know, of my own knowledge, that I have added months to the lives of these people, and with it a great deal of

comfort — which I think is worth while. I believe that, after a while, as my cases increase in number, there will be more than an occasional one of the bad cases which will live, as has the woman I mentioned in the first series of cases treated over four years ago.

DR. WATKINS: Many have been interested in Dr. John Byrne's early work in this subject, which demonstrated that heat was of value in these cases. Byrne was a man of great honesty and of much ability. In a discussion one time, I remember his emphasizing the importance, as Dr. Percy has, of charring and not burning the tissue. He, of course, did not open the abdomen; I think Dr. Percy is the first to have done that.

It seems to me what Dr. Percy has said in regard to curetting these cases is true. Only harm is done by the curette in opening up blood vessels and getting embolic extensions. Another point in these cases is the great value of doing something for these unfortunately incurable patients. It seems to me we should feel a moral obligation to do something for the peace of mind of these patients in conjunction with relief of pain. If one can stop the bleeding, offensive discharge, and the pain, and give the person a certain amount of hope, the treatment is worth while.

It seems to me the doctor's instruments are very ingenious. More recently a number of men have become interested in this work. Dr. Petersen of Ann Arbor is following this method of opening the abdomen. I know three men who have invented water-cooled speculums for use in these cases.

DR. CHANNING W. BARRETT: I have used the cautery considerably for a number of years back, sometimes after operative work had been done, and sometimes in cases we do not consider operable. I have very little to add as to Dr. Percy's method. I never have used the method of opening the abdomen at the same time the cautery was used, although I think we could see some advantages and some disadvantages in that. I must confess that at times I have felt a little question as to how far the cautery was extending into the tissues.

As I recall the cases operated on with the cauteries I have used, I have not seen the need of the superinstrumentation so much as Dr. Percy's work indicates. As I recall, I hardly see that we gain any great advantage by the water-cooled speculum.

We do not have to compare the results of these cases with the results after operation with the knife, because the latter method deals with the better class of cases. This deals with the class of cases that operation would do nothing for, or perhaps make worse. I would hardly feel like using the cautery in place of the radical operation. In one case in which I did the radical operation the carcinoma extended farther than I thought at first and I was not satisfied that I had benefited the patient. In a few months there was a regrowth of the carcinoma where I feared there would be, and the cautery was used, with a good deal of fear that I would strike the ureter — and I think I would have had the same fear if the abdomen had been opened, because I couldn't isolate it. That patient is alive to-day after about seven years.

DR. N. S. HEANEY: There are one or two points I would like to have Dr. Percy bring out. He advises extensive cauterization in the broad ligaments, and this must necessarily interfere with the blood-supply of the upper part of the uterus and of the appendix. For this reason I want to know what objection there would be to the removal of these parts. I have no experience in the method. The second point is as to injuries to the ureters, and what becomes of the ureteral fistula that would be produced by the exploration of the broad ligaments with the cautery?

DR. PERCY: I have found no one, as Dr. Watkins has said, who doubts Byrne's statement that 60 per cent of his cases were cured. I have looked up all that I could find of Byrne's writings on this subject, and it finally dawned on me that he was selecting his cases; that is, he was doing his cautery operation on a class of cases that to-day is being treated by the Ries-Wertheim method. Of course that puts it in an entirely different class from this work that I have been trying to develop. Byrne coned out the cervix with a cautery knife, and he said in his paper that he reached tissues that were involved far beyond the point of contact of his cautery. I did not get interested in this subject in the way of such an extensive application of heat until the laboratory men began to tell us of the hypersensitiveness of the carcinoma-cell and the sarcoma-cell to heat. Heat is the basis, really, of all that I have attempted to do — merely apply heat. I do not try to remove anything. In fact, I don't want to remove anything; I want to use the pathological tissues only to develop heat. And that answers, in a way, Dr. Barrett's reference that it might be a disadvantage to open the abdomen. I open the abdomen only to get more heat, and to know where the heat is needed, and, if possible, to push the pathology down into the

heated area when I cannot reach it by pushing the cautery up into it.

There are no disadvantages in regard to the water-cooled speculum. In my first thirteen cases, before I adopted the method of opening the abdomen, I used to try to use asbestos around the ordinary speculum and the operation was invariably followed by sloughing of the vagina, which precluded any further operative attempts if there should be a recurrence. And, by the way, the recurrence is not unlike that in the breast — one little spot — which needs only slight cauterization to stop its further progress. The water-cooled speculum preserves the vaginal walls intact so that the same method can be used in the vagina again.

Dr. Barrett has very properly brought out the point that the cautery is not used to-day. I think it is going to be used in all classes of carcinoma of the uterus because of the experience that he has already mentioned. One of my patients was a woman with a procidentia and a very small carcinoma of the cervix. I cauterized the cervix, very superficially, I must confess, and fastened gauze over it; I then did a hysterectomy and fastened the vaginal walls to the broad ligaments. In six weeks that woman of 60 had her pelvis full of carcinoma, and I have never felt quite right in reference to that experience. She died in a short time. I stirred up a carcinoma that would have remained latent for a long time if I had left it alone, and I don't believe I would have had that experience using the cautery or Byrne's method.

Dr. Heaney asks, Why not remove the parts with the cautery, or otherwise do an essential hysterectomy? Some seventeen years ago, in 1896, I saw Leopold, in Dresden, do a hysterectomy with the cautery. They have recurrences in these cases simply because they cannot get a sufficient amount of heat. If we remove the uterus in this way, we miss the point of the whole technique; viz., the application of a sufficient amount of heat. The work of Leopold, and others, and especially the French who have been using the cautery to do hysterectomies, show this. They get recurrences. But if we can make the pelvis so hot that it is uncomfortable for your hand, you delay the recurrences.

In reference to the ureters, I have never injured them, so far as I know, with the cautery. I have injured the ureters with the knife. In fact, I have one now, and the woman comes in occasionally and wants to know when I am going to stop the leaking from the abdomen. I cut off the ureter, which I knew at the time, and I thought I had fixed it so that it wouldn't bother her any more; but it is leaking, and some day I will try to unite it, if she lives long enough, and she seems to be doing that. This was a case in which the pelvis was full of enlarged glands. I could not believe they were carcinomatous, and in attempting to take them out, I got into an extensive dissection. I tied the ureter off, and cauterized the end with carbolic acid; but she has a urinary fistula at the present time.

I try to have my assistant find the ureters before anything else is done, when the abdomen is opened. That usually can be done, and a common thing with us is to take an ordinary tenaculum-forceps and grasp it around that region and use it as a guide, simply grossly grabbing the tissues with the ureter and pulling them out of the way. With carcinomatous involvement on one side around the ureter, I would rather destroy the ureter than leave the involved glands.

BOOK REVIEWS

ZUR KENNTNISS DES UTERUSKARZINOMS. A monographic study of its morphology, development and growth, with contributions to its clinical phases. By J. Schottländer and F. Kermauner, of the Second Frauenklinik of the University of Vienna. Berlin: S. Karger, 1912.

This monumental work, dedicated to Alfons von Rosthorn, who in the first place inspired it and, indeed, began it, is based upon a study of 135 cases of carcinoma of the uterus. These were cases operated upon in von Rosthorn's clinics at Graz, Heidelberg, and Vienna, and the investigations have to do with the macroscopic and microscopic morphology of uterine cancer, with its anatomical point of origin, its formal histogenesis, and the method of its development and proliferation, not alone in the uterus but in the neighboring structures as well.

The first chapter is given over to a discussion of the technique and clinical statistics of the radical abdominal operation. The radical operation had been carried out from the beginning, conforming technically since 1905 with Wertheim's method. The vaginal route was employed rather frequently in the earlier series (41 times to 85 by the abdominal route in the Graz series). In all, 677 patients suffering from cervix carcinoma were admitted to the three clinics, upon whom the abdominal operation was performed 256 times, the vaginal 66 times, while high cervical amputation was done twice. Thirty-two patients refused operation. Microscopic examination confirmed the diagnosis in every case, and the percentage of operability was estimated to be 57.22. Cystoscopic examination of the bladder proved to be of little value before operating, but the bladder was actually involved only in the inoperable cases.

Of the 256 abdominal operations, 46 deaths occurred, a mortality corresponding almost exactly with general statistics, 505 deaths in 2,782 cases, or 18.15 per cent. Ninety-four cases have shown preoperative symptoms of from one to three months. Of these, 10 died, or 10.64 per cent. Of 83 cases with symptoms for from three to six months, there were 18 deaths, 21.66 per cent. Where symptoms were present from six months to two years preceding operation, 79 cases, 19 were lost, or 24.05 per cent. Peritonitis was the cause of death in 13 cases, sepsis in 11 cases, collapse in 12, pyelonephritis in 2, pneumonia in 2, while one patient each succumbed to hæmorrhage (following suppuration), pulmonary embolism, tuberculosis, erysipelas, cardiac complications, and anuria.

Hæmorrhage is one of the most annoying complications of the operation; injuries of the bladder occurred 41 times, to the ureters 16 times, and to the rectum 5. Of the 210 surviving patients, 24 sustained vesical fistulæ and 20 ureteral fistulæ. From secondary necrosis the bladder suffered in 16 cases, the ureters in 18, and the intestine twice. Pyelitis, thrombosis, and wound infection are three other complications expressed statistically.

Of the 256 cases operated upon abdominally, 210 made a primary recovery, or 82 per cent. Taking into consideration all the carcinoma cases in the clinic, this means a primary cure of 41.24 per cent. The first Graz series is the only one where observation has extended over a period of five years. Of the 33 cases in this series, Schindler has reported a recovery of 20 per cent and an absolute cure of 4.16 per cent. Of the Vienna material, recurrence took place in 21 cases, 84 surviving the operation. Absolute recovery of the 196 cases (12 vaginal and 10 refused) is 36.2 per cent. Most of the recurrences were local, glandular involvement being found but four times.

Statistics from the Heidelberg series are not so satisfactory. It was possible to follow up but 22 cases, and of these (from three to four years after operation) 14 had survived.

The greater portion of the volume is occupied by a most elaborate description of 137 cases handled by the radical abdominal operation and of 5 cases treated by vaginal extirpation. The macroscopic and microscopic findings are set down in every detail, with a line drawing delineating each case.

Following are long chapters devoted to the anatomic and histologic studies of the material in the laboratory. Here the text becomes such a mass of formulated and statistical information that a mere review of the work would preclude abstracting. Several points of interest, however, are worthy of noting. Thus in over 50 per cent of the cervical cancers the growth reached above the internal os, and the parenchyma of the corpus was also involved. In 120 cases, the growth was limited to but one wall in only 8, and the growth always seemed most intense on the posterior wall. In 58 cases the proliferation was of the endophytic type, in 34 of the exendophytic. Early growth was observed but 28 times, and of these no true portio carcinoma was demonstrable. The point of origin seems to be at the external os, and in nearly every case laceration and ectropion were present. The parametrium was involved 74 times out of the 120 cases of cervix involvement. The exophytic type is less apt to form parametric metastases. Invasion into the lymph glands was observed in 23 out of the 48 cases examined, unilateral only in 16 cases. The iliac,

hypogastric, and sacral glands were most usually involved.

The value of microscopic investigation was fully demonstrated. Much space is given to the consideration of the formal morphologic diagnosis of cancer and of the method of growth in the uterus and extension thence. Great stress is properly laid upon the importance of early diagnosis, and two cases of such are cited where macroscopically the tissues might have readily escaped suspicion.

Thirty pages are devoted to the bibliography alone, essentially covering the entire work on this vast subject. By no means least in value are the sixteen plates in color that appear at the end. These are not only plates of exquisite workmanship but add immensely to the practical worth of the volume. Taken altogether this book epitomizes all research that has been entered into with respect to carcinoma of the uterus. While it is the last word on the subject, it leaves the work unfinished, but stands as an inspiration to all investigators in this field.

CAREY CULBERTSON.

OBSTETRICS. By J. Whitridge Williams, M. D. Third edition. New York: D. Appleton & Co., 1912.

The review of such a work as this consists mainly in the pleasurable enumeration of excellencies which were skillfully combined and arranged in the first edition and are improved and enlarged in each successive issue. A careful revision and the addition of many new plates has kept the work up to date with our technical progress.

The discussion of each subject, with quotations from the leading authorities as well as the author's conclusions therefrom, is clear and comprehensive. The treatment of menstruation and ovulation, for instance, represents all that can safely be predicated at this time.

The bibliography is complete without being burdensome. This feature is in thorough accord with the modern scientific spirit, which lays the grounds of the argument boldly and frankly before the reader so that the reasoning can be followed in its entirety. The absence of such references is evidence, many times, of a dictatorial temperament, and frequently marks the mind that is aspiring and ungenerous to the point of unfairness.

The author takes a strong stand against the use of spinal anæsthesia and the scopolamine-morphine method with its danger to the child. We note too the adequacy of the operative work, and approve and would emphasize the condemnation of forceps as a means of extracting the after-coming head. As Dr. Williams states, the more proficient the obstetrician becomes in the use of the Mauricean-Emellie-Veit method, the less use he will have for forceps. The author claims that the application of forceps to the breech is unnecessary, not to say dangerous; however, the occasion seldom arises where it is demanded.

In common with most American operators, Dr. Williams disparages episiotomy. This operation certainly seems to possess advantages, however, that makes us loth to give it up.

The author's literary style must be commended as one of the permanent charms of the book. It is the more noticeable since in these days the culture which was formerly inseparable from eminence is not regarded as essential in a professional writer.

The book is not a compilation of the work of others, but represents the ripe experience of a scientific, cultured, and well-equipped brain. It inspires confidence and admiration, because it is the gist and summary of a man's life work.

CHARLES B. REED.

MEDICAL MEN AND THE LAW. By Hugh Emmett Culbertson. Philadelphia and New York: Lea & Febiger, 1913.

The author has endeavored to deal with all the main features in modern law pertaining to physicians and surgeons. Obviously it is not intended in any way to interfere with existing text-books treating of medical jurisprudence. After a short introduction and historical survey, a chapter of "definitions" is presented, wherein is shown the legal status of the physician, the consultant, the surgeon, the specialist, the midwife, the optician, the osteopath, and the "healer," as well as certain other representatives of various cults and the cults themselves.

Under the next chapter is considered the practice of medicine and surgery. Here (1) the constitutionality of statutes regulating the practice of medicine, (2) the requirements for admission to practice, (3) what this practice consists in, (4) the right of women to practice, and (5) the right of corporations to practice medicine, are the five subheadings under which most of the moot points of to-day are definitely set forth. Osteopathy, Christian science, midwifery and chiropractice are some of the many items given legal definition in the third group.

Chapter four has to do with the relation of the physician to his patient, while compensation is covered next. The right to recover compensation, the liability for it, the amount of compensation and actions for it are topics taken up in order. Malpractice or negligence is given a very thorough discussion, as is the criminal liability of physicians and surgeons and their exemptions. The competency of physicians to testify as experts and privileged communications are subjects always of intense interest to medical men. A short chapter follows on the right to protect professional reputation, and another on wills completes the volume.

With this very brief summary of the work it is evident that the author has prepared a mass of information that reaches the personal interest of every individual in whatever branch of the healing art. The physician, naturally, is the one most vitally concerned, whether general practitioner, expert, or specialist. The volume in many respects is unique and its compilation within so moderate a compass

indicates careful and thorough selection by the author. A standing medico-legal committee should be one of the cogs in every medical organization and every such committee should have ready knowledge of the substance of this book. Its place in the physician's library is with those few frequently used reference volumes always on the desk.

CAREY CULBERTSON.

HANDBOOK OF DISEASES OF THE RECTUM. By Louis J. Hirschman, M. D. Second edition. St. Louis: C. V. Mosby Co., 1913.

Unlike most revisions, this edition contains several pages less than the first edition, and might have been still further reduced by leaving out the chapter on microscopic and other examination of the fæces, which should be relegated to works on diagnosis.

The work is designed especially for the general practitioner, and for this reason the author lays especial stress on local anæsthesia, office treatment, and so on. For the same reason carcinoma is not considered except insofar as the conditions requisite for early diagnosis are concerned. We believe the wants of those who seek a compact account of the commoner affections of the bowel will be fully met by having this manual in their possession. Attention should also be called to the excellence of the illustrations, more particularly the colored frontispiece, which is an admirable representation of carcinoma complicating hæmorrhoids.

The unfortunate mistake about the derivation of dysentery is still to be found. It comes from *dys* and *enteron*, of course, not *euterou*, as one of the collaborators has it.

SURGERY OF THE EYE. A handbook for students and practitioners. By Ervin Török, M. D., and Gerald H. Grout, M. D. Philadelphia and New York: Lea & Febiger, 1913.

The authors' aim has been to produce "a thoroughly practical work on the surgery of the eye, which will be equally valuable to the student and to the practitioner interested in ophthalmic surgery." The book is practical. All of importance in the furnishing and preparation of the operating room, the selection, use and care of the instruments, the steps necessary in the examination and preparation of the patient, are clearly given in the early chapters. Necessary surgical anatomy, a brief description of the disease for the relief of which the operation is intended, and above all the indications for the selection of the proper procedure in any given case, are definitely and concisely given. Those details so mountainous to the beginner, but so often taken for granted by men of more experience, are thoughtfully included. The routine after-treatment, discussions of complications with prophylactic and active treatment, add much to the beginner's sense of security.

Only the operations in common use to-day, and a few others that in the authors' experience have given good results, are described, thereby avoiding much confusion and greatly facilitating the selection of the most advisable procedures. These operations are described in detail in a manner that shows, as Dr. Arnold Knapp expresses it, the authors' ability to put themselves in the reader's place. The illustrations are well chosen, clearly reproduced, and intelligently diagrammatic. EARLE B. FOWLER.

ORGANIC AND FUNCTIONAL NERVOUS DISEASES. By M. Allen Starr, M. D., Ph. D., LL. D., Sc. D. Fourth edition. New York and Philadelphia: Lea & Febiger, 1913.

The fourth edition of this well-known textbook on nervous diseases is a considerable advance over the previous publications. Particularly in the field of the functional diseases have there been advances since the previous editions which have been freely covered by the author and fuller discussion has been given of the various phases which are becoming clearer to the profession. Psychasthenia is considered apart from neurasthenia and the subjects of consciousness and subconsciousness and other psychic phenomena of mental activities such as hypnosis are briefly discussed.

Altogether it may be said that the student or surgeon who wishes a satisfactory, concise discussion of nervous disorders will find this volume extremely valuable. It is well illustrated and clearly written.

OBSTETRIC AND GYNECOLOGIC NURSING. By Edward P. Davis, A. M., M. D. Fourth edition. Philadelphia and London: W. B. Saunders Co., 1913.

Davis' book on obstetric and gynecologic nursing has reached its fourth edition in twelve years. The work has been revised, enlarged, and brought down to date. It contains many items of practical value for the sick room which have been adopted in large hospitals and the long and valuable experience of the author.

The preparation of the patient and apparatus for obstetrical procedures is well given and the short description of various obstetric operations serves to make the nurse's work more intelligent.

The physician as well as the nurse will find considerable assistance in the care of patients by a study of this book, and by following the precepts therein contained, he will obtain creditable results. To both physician and nurse the book is heartily recommended. HERBERT M. STOWE.